



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**MINDFULNESS TRAINING: WORTHWHILE AS A
MEANS TO ENHANCE FIRST-RESPONDER CRISIS
DECISION MAKING?**

by

John F. Flynn

September 2016

Thesis Co-Advisors:

Christopher Bellavita
Glen Woodbury

Approved for public release. Distribution is unlimited.

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 2016		3. REPORT TYPE AND DATES COVERED Master's thesis
4. TITLE AND SUBTITLE MINDFULNESS TRAINING: WORTHWHILE AS A MEANS TO ENHANCE FIRST-RESPONDER CRISIS DECISION MAKING?			5. FUNDING NUMBERS	
6. AUTHOR(S) John F. Flynn				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB number ____N/A____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) <p>This thesis identified a need for improvement in first-responder crisis decision making. The primary research question was, would mindfulness training be worthwhile as a means to enhance first-responder crisis decision making? Qualitative research methods (primarily a thematic analysis of the literature) were utilized to explore the areas of first responder operations, crisis decision making, and mindfulness training to identify key categories in the data relevant to the primary and sub-research questions. Evidence uncovered during this research supports a conclusion that mindfulness training may be one way in which first responders can improve upon their capacity to make effective decisions during a crisis. It was demonstrated that these improvements to crisis decision making resultant from mindfulness training could very well culminate in significant improvement of outcomes during future emergencies and disasters at which mindful first responders are present. Despite significant implementation challenges that were identified, systematic analysis of the literature revealed sufficient evidence to warrant serious consideration for further study and application of this theory in the field, including potential implementation of discipline-specific and culturally relevant mindfulness training systems within first responder organizations.</p>				
14. SUBJECT TERMS mindful, mindfulness, meditation, decision making, crisis decision making, situational awareness, sensemaking, attentional control, attentional training, cognitive bias, self-awareness, meta-awareness, neuroplasticity, neuroscience, organic technology, working memory capacity, first responder, focus, stress management, non-reactivity, mindfulness-based resilience training, mindfulness-based stress reduction, mindfulness-based attention training, mindfulness-based mind fitness training, strength training for attention and resilience in ROTC cadets			15. NUMBER OF PAGES 127	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified		18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified		19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified
20. LIMITATION OF ABSTRACT UU				

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release. Distribution is unlimited.

**MINDFULNESS TRAINING: WORTHWHILE AS A MEANS TO ENHANCE
FIRST-RESPONDER CRISIS DECISION MAKING?**

John F. Flynn
Assistant Chief, City of Yonkers, New York Fire Department
A.S., Corning Community College, 2008
B.S., American Military University, 2014

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
September 2016**

Approved by: Christopher Bellavita
Thesis Co-Advisor

Glen Woodbury
Thesis Co-Advisor

Erik Dahl
Associate Chair of Instruction
Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This thesis identified a need for improvement in first-responder crisis decision making. The primary research question was, would mindfulness training be worthwhile as a means to enhance first-responder crisis decision making? Qualitative research methods (primarily a thematic analysis of the literature) were utilized to explore the areas of first responder operations, crisis decision making, and mindfulness training to identify key categories in the data relevant to the primary and sub-research questions. Evidence uncovered during this research supports a conclusion that mindfulness training may be one way in which first responders can improve upon their capacity to make effective decisions during a crisis. It was demonstrated that these improvements to crisis decision making resultant from mindfulness training could very well culminate in significant improvement of outcomes during future emergencies and disasters at which mindful first responders are present. Despite significant implementation challenges that were identified, systematic analysis of the literature revealed sufficient evidence to warrant serious consideration for further study and application of this theory in the field, including potential implementation of discipline-specific and culturally relevant mindfulness training systems within first responder organizations.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	BACKGROUND	1
B.	PROBLEM SPACE	3
C.	PURPOSE OF STUDY	5
D.	RESEARCH QUESTIONS.....	6
E.	RESEARCH DESIGN	6
F.	SIGNIFICANCE OF RESEARCH	8
II.	EVIDENCE FROM LITERATURE ON CRISIS DECISION MAKING	9
A.	INTRODUCTION.....	9
B.	COMPLEXITY, CHAOS, AND THE CYNEFIN FRAMEWORK.....	9
C.	SITUATIONAL AWARENESS VS. SENSEMAKING	14
D.	TRADITIONAL VS. NATURALISTIC PARADIGM OF DECISION MAKING	20
E.	BOYD’S OODA LOOP	25
F.	COGNITIVE BIAS.....	28
G.	INFLUENCE OF STRESS.....	33
H.	WHERE DOES THE NATIONAL INCIDENT MANAGEMENT SYSTEM FIT IN?	37
I.	CONCLUSION	39
III.	SYSTEMATIC REVIEW AND META-ANALYSIS OF THE MINDFULNESS TRAINING LITERATURE.....	43
A.	INTRODUCTION.....	43
B.	MINDFULNESS PRACTICE.....	46
C.	MINDFULNESS TRAINING PROGRAMS.....	49
D.	BEHAVIORAL CHANGES	52
E.	NEUROLOGICAL, PHYSIOLOGICAL, AND BIOCHEMICAL CHANGES	58
F.	COUNTERARGUMENTS AND CAUTIONS.....	62
G.	CONCLUSION	66
IV.	ANALYSIS	67
A.	INTRODUCTION.....	67
B.	BENEFITS OF MT THAT CORRELATE TO ENHANCED CRISIS DECISION MAKING	68

1.	Improved Working Memory Capacity	68
2.	Improved Situational Awareness and Sensemaking Skills and Abilities	68
3.	Enhanced Self-Awareness and Improved Attentional Control	70
4.	Reduced Feelings of Stress, Threat, and Fear	73
5.	Wisdom and Bravery	76
6.	Significance of Availability of New Research Techniques	76
C.	CONCLUSION	77
V.	FINDINGS	79
A.	KNOWLEDGE GAPS AND LIMITATIONS, AND OPPORTUNITIES FOR FUTURE RESEARCH	79
B.	RECOMMENDATIONS AND IMPLEMENTATION.....	80
VI.	CONCLUSION	85
	LIST OF REFERENCES	89
	INITIAL DISTRIBUTION LIST	101

LIST OF FIGURES

Figure 1.	Cynefin Framework.	11
Figure 2.	Conditions Favoring Intuitive and Analytical Approaches.	21
Figure 3.	Expert Decision making Model Based on the Recognition-Primed Decision Model Pioneered by Research Psychologist Gary Klein.	23
Figure 4.	OODA Loop.....	26
Figure 5.	OODA As Illustrated by Boyd.....	27
Figure 6.	Diagram Drawn by Redima (Randy) Fernando of Mindful Schools.....	73

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

Table 1.	Several Definitions of Mindfulness.	45
Table 2.	Trojan Warrior Project Sample of Outcomes.	57

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

DHS	Department of Homeland Security
EMS	emergency medical service
FDNY	Fire Department of the City of New York
FEMA	Federal Emergency Management Agency
HSPD-5	Homeland Security Presidential Directive-5
IAFC	International Association of Fire Chiefs
IAFF	International Association of Firefighters
IC	incident commander
ICBM	integrative body-mind training
ICS	incident command system
MBAT	mindfulness-based attention training
MBCT	mindfulness-based cognitive therapy
MBRT	mindfulness-based resilience training
MBSR	mindfulness-based stress reduction
MMFT	mindfulness-based mind fitness training
MT	mindfulness training
NBA	National Basketball Association
NDM	naturalistic decision making
NGO	non-governmental organization
NIMS	National Incident Management System
OODA	observe orient decide act
PTSD	posttraumatic stress disorder
ROTC	Reserve Officers Training Corps
RPD	recognition primed decision
SA	situational awareness
SIY	search inside yourself program
STARR	strength training for attention and resilience in ROTC
USAF	United States Air Force

WMC	working memory capacity
WYSIATI	what you see is all there is

EXECUTIVE SUMMARY

It has been said, “A warrior’s most formidable weapon is his mind. It follows then that the sharper the commander’s mind, the sounder the decisions.”

—Arjen Boin et al., *The Politics of Crisis Management*

The primary aim of this thesis was to examine the potential for mindfulness training (MT) to be worthwhile as a means to enhance first-responder crisis decision making. *Mindfulness* has been defined as “the awareness that arises through paying attention on purpose in the present moment- non-judgmentally,”¹ or “intentionally being acutely aware of what is going on internally as well as externally, without reacting.”²

Secondary, and related, questions were:

- What do the predominant paradigms, frameworks, models, and systems reveal about how first responders make decisions during crises?
- What human factors, skills, and abilities correlate with enhanced first-responder crisis decision making?
- What has been the impact of MT on various aspects of human performance that might demonstrate applicability to first-responder crisis decision making?
- What counterarguments and cautions should be considered in the examination of the potential for MT programs to enhance first-responder crisis decision making?
- How might MT programs be effectively implemented within first responder programs?

¹ Jon Kabat-Zin, *Wherever You Go, There You Are: Mindful Meditation in Everyday Life* (Hoboken, NJ: Hyperion, 1994).

² Patricia A. Deuster and Eric Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” *Journal of Special Operations Medicine* 15, no. 1 (Spring 2015): 93.

The research methods used were qualitative³ (primarily literature review). Within this literature review, a predominately thematic analysis⁴ was conducted to identify key categories in the data relevant to the thesis questions. This analysis served as a central component of the explorative research paradigm⁵ through which this thesis has been framed.

Although mindfulness has its roots in Eastern spiritual practices, and particularly Buddhist meditation,⁶ this thesis focuses on a secular methodology not directly connected to any religious or spiritual practice. The discussion in this thesis of whether or not MT might enhance first-responder crisis decision making is primarily concerned with first responders who are acting in a decision making role.

In regard to the primary question concerning whether MT is worthwhile as a means to enhance first-responder crisis decision making, evidence is presented demonstrating that MT may be one way in which first responders can improve upon their capacity to make effective decisions during crisis. The thesis delineates how MT has been shown to result in behavioral, neurological, physiological, and biochemical changes, development of a variety of human factors, and the learning of skills and abilities applicable to this desired performance improvement. Some researchers have referred to these human factors, skills, and abilities as *sources of power*.⁷ It is demonstrated that mindfulness is likely to result in such sources of power as improvements to working memory capacity, attentional control, tolerance for challenging experience, heightened awareness, and the elimination or reduction of negative emotions, anxieties, biases, and expectations. Additionally, mindfulness appears to have a positive correlation to the ability to respond rather than to react, as well as the capacity to engage in creative

³ Michael Quinn Patton, *Qualitative Research & Evaluation Methods*, 3rd ed. (Thousand Oaks, CA: Sage Publications, 2002).

⁴ Gail Fann Thomas, "Research Methods: Qualitative Data Analysis" (class notes, Naval Postgraduate School, n.d.).

⁵ John W. Creswell and Vicki L. Plano Clark, *Designing and Conducting Mixed Methods Research*, 2nd ed. (Thousand Oaks, CA: SAGE Publications, 2007), <http://doc1.lbfl.li/aca/FLMF022364>.

⁶ Michael A. West, *The Psychology of Meditation* (Oxford, UK: Oxford University Press, 2016).

⁷ Gary Klein, *Sources of Power* (Cambridge, MA: The MIT Press, 1998).

thinking under pressure, and the facility to avoid the negative effects of information overload by more effectively maintaining focus on the information that is relevant; the signals within the noise of a crisis event.

To arrive at the above conclusions in regard to the primary research question, an examination and analysis of the predominant decision making *paradigms, frameworks, models, and systems* was conducted to better understand how first responders make decisions during crises. This examination and analysis revealed that the aforementioned *sources of power* represent many of the *human factors, skills, and abilities* that correlate well with enhanced crisis decision making.

Research revealed a variety of valid counterarguments, cautions, and implementation challenges that should be taken into account in the consideration of the potential for MT programs to enhance first-responder crisis decision making. Despite these not insignificant implementation challenges, this thesis proposes that at some point in the future, MT will be accepted as being equally essential to a first responder's fitness routine as physical training is today. Implementation recommendations included a deliberate focus on the strong neurological, physiological, and biochemical evidence in the argument for MT training, branding mindfulness, and MT with terms that would tend to be attractive to first responders, crafting of MT programs, which include some aspect or aspects of physical movement, development of discipline specific, and culturally relevant MT systems, seeking the cooperation of management, as well as labor organizations, and considering application for grant funding from a variety of sources. Ultimately, this thesis concludes by calling for the homeland security community to place a heightened emphasis on the exploration of first responder MT in the continual pursuit of a more secure and resilient nation.

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

What an experience! I am enormously grateful for the opportunities that I have had at the Naval Postgraduate School in beautiful and inspirational Monterey.

To all of my cohort mates in not only the master's program, but in the executive leader's program as well, thank you for your friendship. I am a better person for having known you, and I look forward to a lifetime of knowing you.

To City of Yonkers Mayor Michael Spano and Yonkers Fire Department Commissioner Robert Sweeney, thank you for allowing me to spend time away from work to attend the Naval Postgraduate School.

To the faculty and staff at the Center for Homeland Defense and Security (CHDS), thank you for creating a home away from home. CHDS is a welcoming and safe environment in which my cohort mates and I were challenged to think, to inquire, and to explore. Ultimately, we learned to become more effective questioners, critical thinkers, and homeland security practitioners.

In particular, I am indebted to Dr. Chris Bellavita, who encouraged me to consider attending this rigorous master's program relatively late in life. His very unique ways of viewing the world, and tremendous talent for teaching and inspiring, have benefited me personally and professionally beyond measure.

Thank you, Glen Woodbury, for your valuable thesis advising, for your personal interest in my thesis topic, and for your support during a turbulent period of time for me at work that unfortunately coincided with some of my time at CHDS.

Mom, thank you for your unconditional love and support. Aunt Peggy, thank you for your love and encouragement as well, and for some valuable advice when it was needed.

To my tremendous family, my fiancé and soul mate Jenny, and children Stuart, Kate, and Sarah-Grace, thank you for putting up with me during the last 18 months. I am

sorry to have been distracted, tired, and so often absent during that time. There are no words to adequately express the depth of my love and appreciation for each of you.

To all first responders, especially my brother and sister firefighters who struggle every day to return the chaotic to a state of normalcy, thank you for what you do. I hope in some small way this thesis may assist some of you in the daily mission to serve and protect.

PROLOGUE

Very few individuals who were members of the fire service on December 3, 1999, will ever forget the events of that day in Worcester, Massachusetts. It was there, at a fire in which six Worcester firefighters gave their lives, when District Chief Mike McNamee made a fateful decision that likely saved more firefighters from perishing in a fruitless attempt to locate and rescue the six who had gone missing.⁸ The fire was in an old, vacant cold storage warehouse—an extremely large, multi-story, maze-like, and windowless building. This inferno was very advanced upon arrival of the Worcester fire department, and its exponential growth was being fueled by the cork and polystyrene insulating materials that covered the floors, walls, and ceilings throughout this mega-structure. McNamee, the incident commander, had been engaging in “sizing-up” this complex and unusual fire from the moment he was dispatched, in an attempt to gain situational awareness. The chief was focused on making sense of the type and size of the building, its contents, occupancy, size and location of fire, location of firefighters and their apparatus, water supply available, weather conditions, and a host of other relevant factors.

Shortly after arrival, two firefighters became disoriented and lost as they searched for the source of the fire, as well as for vagrants who might be trapped within the structure. Additional teams of firefighters attempted to locate and rescue these two lost men, and in the process, another four firefighters also went missing. It is at this point of the tragic event where the discussion turns to a narrative published in *Firehouse Magazine* that provides a poignant illustration of a first responder obliged to make a very difficult crisis decision. While the focus of this thesis is not limited to decisions made in such extreme and chaotic environments as the one to follow, this brief account serves as a

⁸ “Six Career Firefighters Killed in Cold-Storage and Warehouse Building Fire-Massachusetts,” September 27, 2000, <https://www.cdc.gov/niosh/fire/reports/face9947.html>.

reminder of the potential demand for excruciatingly difficult and complex crisis decision making that exists for virtually all first responders each time they report for duty.

* * *

It took a minute, a very long minute, for Retired District Fire Chief Mike McNamee to make a decision he would never forget, nor never regret.

An aggressive, veteran firefighter had just battled his way back out of the Worcester Cold Storage and Warehouse Co. building that was now becoming well involved and untenable. He had the stuffing knocked out of him, his coat was steaming. He pulled his mask off and gave McNamee, the incident commander, a report.

“It’s bad in there,” the Lieutenant said, reporting zero visibility with thick black smoke that made any search and rescue impossible. McNamee considered the words of his trusted brother.

He knew there were six of his men inside. He knew their fate. He thought for a minute, a full minute he says, and made an announcement.

“Look, it’s over,” he told the crews packed up and ready to go in to get their brothers. “It’s over. No more.”

In disbelief, they started yelling at the chief on that chilly December 3, 1999 night.

“They were mad, they were yelling at me,” said McNamee. “What do you mean we’re not going up? What are you talking about? You can’t do that.”

McNamee steadied himself, braced his feet on the door jamb and put his hands over his head to more fully block the entrance. He raised his voice and bellowed, “Look, we’ve already lost six, we’re not going to lose any more.”

The firefighters went silent, and stepped back.

In that minute he mulled the risk and decided, it was all loss, nothing positive would come of sending more men inside.⁹

* * *

This veteran chief, confronted by a dire situation that was far out of the realm of any of his previous experience or training, was able to make what to most firefighters would be a completely counterintuitive decision; to leave brother firefighters behind. Yet, in retrospect, this decision made perfect sense and very likely saved the lives of other firefighters who would have almost certainly pushed themselves past the point of no return in a futile rescue effort. At that pivotal moment, Chief McAfee likely would never have been fully confident that his decision to cease the search for his six lost firefighters was correct. In the days after Chief McAfee's decision, it was judged by most, including a large number of Worcester firefighters as what it was; a moment of clarity amidst chaos...wise and courageous.¹⁰

So, would MT potentially aid other first responders finding themselves in similar situations to the one Chief McAfee was challenged with on that cold December night, or in less chaotic crisis events? Answering that question is the aim of this thesis.

⁹ Ed Ballam, "A Minute Decided Worcester's Fate," *Firehouse.Com News*, December 2009, doi:10470598.

¹⁰ Jim Keogh, "The Fire That Still Burns," December 2, 2009, *Worcester Magazine*, <http://worcestermag.com/2009/12/02/the-fire-that-still-burns/7157>.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. BACKGROUND

First Responders

When I was a boy and I would see scary things in the news, my Mother would say to me, “look for the Helpers, you will always find people who are helping.”

—Fred Rogers

First responders are defined by the Department of Homeland Security (DHS) as individuals and agencies who “in the early stages of an incident are responsible for the protection and preservation of life, property, evidence and the environment.”¹ These first responders (generally police, fire, and emergency medical service) are regularly called to the scene of chaotic events, where decisions made and actions taken in the first, critical minutes, or in some events, hours, will ultimately determine whether the event is resolved as effectively as possible. In the realm of the first responder, the degree of effectiveness correlates directly with lives saved or lost, extent of damage to property or the environment, and the ultimate toll of human suffering.

For catastrophic events, such as the 9/11 attacks, or Hurricane Katrina, decisions made by responders in the initial minutes or hours can have a cascading effect on U.S. national security or the state of this nation’s economy. In fact, in today’s interconnected world, at times, it can take far less than a catastrophic 9/11 or Katrina scenario to cause significant effects on a national level. For instance, in recent years, a number of police use of force scenarios involving high-stakes decisions that were of necessity made rapidly, and under conditions of uncertainty, have resulted in widespread and extreme criticism, and at times, a loss of confidence in law enforcement from the communities

¹ The White House, *Homeland Security Presidential Directive-8* (Washington, DC: The White House, 2003).

which they serve. Several of these incidents have led to massive civil unrest and upheaval on a national level.²

Generally, decisions that dictate the actions of first responders at crises are made by the ranking individual present at the scene, the *incident commander* (IC),³ as well as other responders who serve in subordinate leadership roles. These decision-makers might be a lone police officer, the supervisor of a fire company, an emergency medical technician, or an individual who is significantly higher up in the chain of command. Whether the crisis is a catastrophic event, such as 9/11, Katrina, Oklahoma City, the Orlando nightclub mass shooting, or a less catastrophic, yet nonetheless chaotic incident, such as a motor vehicle accident with injuries, various medical emergencies, a house fire, or a bar room brawl, the ability of first responders rapidly and effectively to process the abundance of stimuli that their senses are receiving, to make meaning of these stimuli, and to then direct the response effectively, is essential.⁴ A fire officer who arrives at the scene of a multiple-residence fire with reports of people trapped, a police supervisor responding to the scene of an active shooter, or an emergency medical provider directing the care of numerous critically injured patients at the scene of a mass casualty incident will all be struggling to attempt to make sense out of the many cues and clues that are coming at them in rapid fire fashion. However, the very nature of chaos requires that the IC swiftly make decisions that will direct the actions of responders absent a complete and accurate picture of all that is actually taking place.⁵ First responders refer to this mental picture of all that is occurring at a crisis event as *situational awareness* (SA).⁶

² Alex Altman, "Person of the Year: The Short List, No. 4: Black Lives Matter," *Time Magazine*, accessed August 15, 2016, <http://time.com/time-person-of-the-year-2015-runner-up-black-lives-matter/> on.

³ Emergency Management Institute, *ICS Glossary* (Emmitsburg, MD: Emergency Management Institute, 2008), <https://training.fema.gov/emiweb/is/icsresource/assets/icsglossary.pdf>.

⁴ Leonard J. Marcus, Eric McNulty, Barry C. Dorn, and Eric Goralnick, *Crisis Meta-Leadership Lessons from the Boston Marathon Bombings Response: The Ingenuity of Swarm Intelligence* (Cambridge, MA: Harvard School of Public Health and the Harvard Kennedy School of Government, Center for Public Leadership, 2014), <https://cdn2.sph.harvard.edu/wp-content/uploads/sites/8/2014/04/April-2014-Prelim-Report-Dist1.pdf>.

⁵ Cynthia Renaud, "The Missing Piece of NIMS: Teaching Incident Commanders How to Function in the Edge of Chaos," *Homeland Security Affairs*, June 1, 2012, <https://www.hsaj.org/articles/221>.

⁶ Martha Dow, Len Garis, and Larry Thomas, *Reframing Situational Awareness within the Fire Service Culture* (Abbotsford, BC: Centre for Public Safety and Criminal Justice Research, University of the Fraser Valley, 2013).

B. PROBLEM SPACE

A paper issued by the International Association of Fire Chiefs (IAFC) asserts, “Effective decision making, perhaps more than any other skill, is critical to successful incident command.”⁷ While perhaps self-evident to most readers, what may not be as obvious is mentioned elsewhere in this IAFC paper, “despite improvements in technology, decision making in a crisis has not improved to the same levels.”⁸ Many in the law enforcement community are also aware of the idea that police crisis decision making is in need of improvement. Dr. Laura Zimmerman argues, “Police training tends to focus on tactical skills with little focus on how officers should think about situations and make decisions [yet] during critical incidents, technical skills alone will not ensure officer survival; officers must possess exceptional decision making skills.”⁹ Zimmerman adds, “Law enforcement is under the lens of a microscope in ways never before experienced. The decisions officers make may very well be the difference between life and death. For these reasons, the time has come to take a look at our current training methodologies and begin considering others.”¹⁰ Furthermore, an article in the *Journal of Emergency Medical Services* observes, “Research continues to reveal that emergency medical service (EMS) responders may benefit from increasing their practice of critical thinking, problem-solving, and decision making in initial and continuing education.”¹¹

Thus, it is evident that crisis decision making has been identified by a variety of first responder thought leaders as both important and in need of improvement. This problem of a need for improvement in the area of first-responder crisis decision making is

⁷ International Association of Fire Chiefs Technology Council, *An Information Paper on Crisis Decision-Making Training Technology* (Fairfax, VA: International Association of Fire Chiefs, 2012), 2, <https://www.iafc.org/files/1COMMTECH/InformationPaperonCrisisDecisionMakingTech.pdf>.

⁸ Ibid.

⁹ Laura Ann Zimmerman, “Beyond Tactics: Enhancing Decision-making Skills during Critical Incidents,” *NRA Law Enforcement Quarterly*, Spring 2007.

¹⁰ Laura A. Zimmerman and David Blake, “Officers Facing Criminal Charges; Faulty Decision Making?” *ILEETA Journal* 5, no. 4 (Winter Edition 2015), 5–7, <http://lifteraftinc.com/images/uploads/ILEETA-Journal-4th-Edition-2015.pdf>.

¹¹ David L. Sullivan, “Learn to Make Better Decisions and Improve Patient Care,” *Journal of Emergency Medical Services*, March 31, 2010, <http://www.jems.com/articles/print/volume-35/issue-4/training/learn-make-better-decisions-an.html>.

the focus of this thesis. It is proposed that a better understanding of the various *human factors, skills, and abilities* involved in crisis decision making, coupled with training programs designed to enhance those human factors, skills, and abilities that aid in good decision making, and to mitigate against those human factors that may harm good decision making, would be beneficial not only to these heroes who must regularly place themselves in harm's way in the midst of chaos, but to those who these responders serve and protect as well. This thesis hypothesizes that implementation of mindfulness training (MT) programs may be worthwhile as a means to enhance first-responder crisis decision making.

So what is mindfulness? One definition of *mindfulness* is:

The combination of ongoing scrutiny of existing expectations, continuous refinement and differentiation of expectations based on newer experiences, willingness and capability to invent new expectations that make sense of unprecedented events, a more nuanced appreciation of context and ways to deal with it, and identification of new dimensions of context that improve foresight and current functioning.¹²

More simply, *mindfulness* has been defined as “the awareness that arises through paying attention on purpose in the present moment- non-judgmentally,”¹³ or “intentionally being acutely aware of what is going on internally as well as externally, without reacting.”¹⁴ Arguably, first responders have practiced mindfulness for generations, regardless if this specific term has actually been used. For instance, during police firearms training, trainees practice focusing on the target and controlling their breathing.¹⁵ Firefighters, while learning to use self-contained breathing apparatus, are trained to control their

¹² Karl E. Weick and Kathleen M. Sutcliffe, *Managing the Unexpected; Resilient Performance in an Age of Uncertainty* (Hoboken, NJ: John Wiley & Sons, 2011), 32.

¹³ Jon Kabat-Zin, *Wherever You Go, There You Are: Mindful Meditation In Everyday Life* (Hoboken, NJ: Hyperion, 1994).

¹⁴ Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 93.

¹⁵ David A. Grossman, *On Combat: The Psychology and Physiology of Deadly Conflict in War and Peace*, 3rd ed. (Mascoutah, IL: Warrior Science Publications, 2008).

breathing and anxiety levels.¹⁶ Firefighters are also taught how to focus on their sense of feel and sense of direction while operating in limited or zero visibility conditions.¹⁷ Paramedics strive to focus attention on a patient's signs and symptoms while avoiding distraction from the various disconcerting sights and sounds normally a component of these stressful events.¹⁸ Commanders seek to master skills and abilities that will enable them to maintain a command presence in the midst of chaos, to focus on the most relevant cues and clues, including the whereabouts and actions of their subordinates, while avoiding distraction from irrelevant or less pertinent information, and to then make rapid-fire decisions and then implement them by issuing orders clearly and confidently.¹⁹ It is plausible to categorize all of this as mindfulness. This thesis intends to demonstrate that through enhancing mindful skills and practices through a more conscious, deliberate, and structured focus on MT, it is possible to improve first-responder crisis decision making.

C. PURPOSE OF STUDY

Thesis research focused on the concept of mindfulness in the context of first-responder crisis decision making. The research sought to determine whether evidence is available that demonstrates whether or not MT may be worthwhile in pursuit of improving the ability of first responders to make effective (mindful) decisions during crisis events.

¹⁶ Nathan Demaree, "Overcoming Panic: Stress Induced Training and Education," *Fire Engineering*, May 1, 2015, <http://www.fireengineering.com/articles/print/volume-168/issue-5/departments/training-notebook/overcoming-panic-stress-induced-training-and-education.html>.

¹⁷ Tim Robinson, "Wayfinding in Zero Visibility," *Fire Engineering*, December 20, 2013, <http://www.fireengineering.com/articles/print/volume-166/issue-12/departments/training-notebook/wayfinding-in-zero-visibility.html>.

¹⁸ Jayne Sears, "The Importance of Vital Signs," *Fire Engineering*, October 1, 2007, <http://www.fireengineering.com/articles/print/volume-168/issue-5/departments/training-notebook/overcoming-panic-stress-induced-training-and-education.html>.

¹⁹ Anthony Kastros, "Mastering Fireground Command, Calming the Chaos" *Fire Engineering*, March 2011, <http://www.fireengineering.com/articles/print/volume-164/issue-8/features/mastering-fireground-command-10-commandments-of-command.html>.

D. RESEARCH QUESTIONS

(1) Primary Research Question

- Would MT be worthwhile as a means to enhance first-responder crisis decision making?

(2) Subquestions

- What do the predominant paradigms, frameworks, models, and systems reveal about how first responders make decisions during crises?
- What human factors, skills, and abilities correlate with enhanced first-responder crisis decision making?
- What has been the impact of MT on various aspects of human performance that might demonstrate applicability to first-responder crisis decision making?
- What counterarguments and cautions should be considered in the examination of the potential for MT programs to enhance first-responder crisis decision making?
- How might mindfulness-training programs be effectively implemented within first responder programs?

E. RESEARCH DESIGN

The areas of research were first responder operations, crisis decision making, and MT. Qualitative research methods²⁰ were implemented through a literature review of relevant texts, as well as scholarly and non-scholarly articles. Within this literature review, a predominately thematic analysis²¹ was conducted to identify key categories in the data relevant to the thesis questions. This analysis served as a central component of the explorative research paradigm²² through which this thesis has been framed.

The ultimate aim of this research was to explore how an understanding of the concept of mindfulness and MT, might potentially improve (or perhaps not) the decision

²⁰ Michael Quinn Patton, *Qualitative Research & Evaluation Methods*, 3rd ed. (Thousand Oaks, CA: Sage Publications, 2002).

²¹ Gail Fann Thomas, "Research Methods: Qualitative Data Analysis" (class notes, Naval Postgraduate School, n.d.).

²² John W. Creswell and Vicki L. Plano Clark, *Designing and Conducting Mixed Methods Research*, 2nd ed. (Thousand Oaks, CA: SAGE Publications, 2007), <http://doc1.lbfl.li/aca/FLMF022364.pdf>.

making abilities of first responders whose decisions will affect the outcome of these events. This goal was accomplished through an “if this _____ then _____” process of first examining the various decision making paradigms, frameworks, models, and systems relevant to understanding and overcoming the problems and difficulties faced by first responders during the crisis decision making process for the purpose of identifying the *human factors, skills, and abilities* that correlate with enhanced first-responder crisis decision making. Next, research explored the various existing definitions of *mindfulness*, for the purpose of selecting on which definitions this thesis should focus. Although mindfulness has its roots in Eastern spiritual practices, and particularly Buddhist meditation, this thesis focuses on a secular methodology not directly connected to any religious or spiritual practice. It is also important to note that the discussion in this thesis of whether MT might enhance first-responder crisis decision making is primarily concerned with first responders who are acting in a decision making role, from the first-line supervisor rank through incident commander. Therefore, for the purpose of this thesis, it should be understood that the emphasis is on decisions made by responders with varying levels of experience and expertise, but who in all cases, are not novices.

Only after the aforementioned steps had been accomplished did the research process turn to an examination of MT in an attempt to assess the state of knowledge of the application of MT toward the improvement of first-responder crisis decision making. Last, the literature was reviewed in an attempt to determine through analysis if any of the existing MT programs, or potentially an as yet to be developed MT program, might be likely to produce or enhance the human factors, skills, and abilities of good first responder crisis decision-makers that the thesis research had previously delineated. The degree to which MT produced or enhanced human factors, skills, and abilities that correlate with good crisis decision making would serve as the evidence for or against the hypothesis that MT is worthwhile as a means to enhance first-responder crisis decision making. In short, it was theorized that if the evidence led to a conclusion that MT does in fact produce or enhance the “things” that contribute to good crisis decision making, and reduce or eliminate the “things” that contribute to poor crisis decision making, then it would support a conclusion that the potential for MT to be worthwhile as a means of

enhancing first-responder crisis decision making is good. Accordingly, the evidence discussed in this thesis concerning MT as potentially effective in enhancing first-responder crisis decision making is divided into two categories, *first-responder crisis decision making* and *MT*. Analysis, findings, recommendations, and conclusion will follow.

F. SIGNIFICANCE OF RESEARCH

Review of the literature reveals scant research has been conducted specifically to determine the potential benefit of MT to improve first-responder crisis decision making. Evidence uncovered during the research for this thesis, however, supports a conclusion that MT has equal potential to affect the *cognitive* aspects of first responder performance positively during crisis events as does today's *physical* training positively impacts first responder physical performance at these same incidents. If so, in the future, MT is likely to be accepted as being equally as essential to a first responder's fitness routine as physical training is today. The improvements to crisis decision making resultant from MT could very well culminate in significant improvement of outcomes during future emergencies and disasters at which mindful first responders are present.

II. EVIDENCE FROM LITERATURE ON CRISIS DECISION MAKING

A. INTRODUCTION

Robert Bertrand and Chris Lajtha note, “crises are characterized by the absence of obvious solutions, the scarcity of reliable information when it is needed, and the lack of time to reflect on and debate alternative courses of action.”²³ Heal describes a crisis as “an emotionally stressful event or situation involving an impending, abrupt, and decisive change.”²⁴ Joseph Pfeifer, a thought leader in first responder crisis leadership,²⁵ has defined decision making skill as, “The ability to quickly combine intuition with analysis to choose a course of action under stress and uncertainty.”²⁶ For the purpose of this thesis, *crisis decision making* will be defined as: *decisions made by first responders that determine response actions to rapid onset, man-made or naturally occurring events that threaten life or property.*

B. COMPLEXITY, CHAOS, AND THE CYNEFIN FRAMEWORK

First responders must make decisions and take action at a variety of crises that vary widely in their level of complexity. The *Cynefin framework* is a sensemaking (more on that later) tool that has great potential to assist first responders with understanding, among other things, how best to match decision making styles with the context of the particular event with which they are dealing. Welsh scholar Dave Snowden chose the term “*cynefin*, (pronounced ku-nev-in), ... a Welsh word that signifies the multiple

²³ Robert Bertrand and Chris Lajtha, “A New Approach to Crisis Management,” *Journal of Contingencies and Risk Management* 10, no. 4 (December 2002): 184.

²⁴ Sid Heal, *Sound Doctrine: A Tactical Primer* (New York: Lantern Books, 2000), 27.

²⁵ Joseph Pfeifer is the Chief of Counterterrorism and Emergency Preparedness for the New York City Fire Department (FDNY). He has extensive experience commanding fires and emergencies in New York City. He is a Senior Fellow at the Program on Crisis Leadership at the Harvard Kennedy School. He has written and spoken extensively, nationally and internationally, on crisis leadership. Information retrieved from Joseph Pfeifer biography on the website of the West Point Combatting Terrorism Center. “Chief Joseph W. Pfeifer,” accessed January 21, 2016, <https://www.ctc.usma.edu/posts/experts/chief-joseph-pfeifer>.

²⁶ Joseph Pfeifer, *Crisis Leadership: The Art of Adapting to Extreme Events* (Cambridge, MA: Harvard Kennedy School, HKS Program on Crisis Leadership, 2013), 20, <http://www.hks.harvard.edu/content/download/67377/1242318/version/1/file/Pfeifer+Crisis+Leadership--March+20+2013.pdf>.

factors in our environment and our experience that influence us in ways we can never understand.”²⁷ The Cynefin framework has been utilized by agencies of the U.S. government in counterterrorism efforts, as well as by hundreds of high-performing private sector and government organizations.²⁸ Cynefin classifies issues (or in the case of this thesis, crises) “into five categories based upon “the relationship between cause and effect.”²⁹ Four of these decision making domains, “*simple* [updated in 2014 to “*obvious*”],³⁰ *complicated*, *complex*, and *chaotic*,”³¹ require decision-makers to *size-up* (more on that term later) a situation, and to then act in a manner suitable to the particular context. The fifth domain, *disorder*, exists when the decision-maker is unsure as to which of the other four domains, or contexts, is applicable.³²

Figure 1 is a visual representation of the Cynefin framework as envisioned by Dave Snowden.

²⁷ David J. Snowden and Mary E. Boone, “A Leader’s Framework for Decision Making,” November, 2007, Harvard Business Review, <https://hbr.org/2007/11/a-leaders-framework-for-decision-making>.

²⁸ Ibid.

²⁹ Ibid.

³⁰ “The Cynefin Framework,” June 14, 2016, <https://www.mindtools.com/pages/article/cynefin-framework.htm>.

³¹ Snowden and Boone, “A Leader’s Framework for Decision Making.”

³² Ibid.

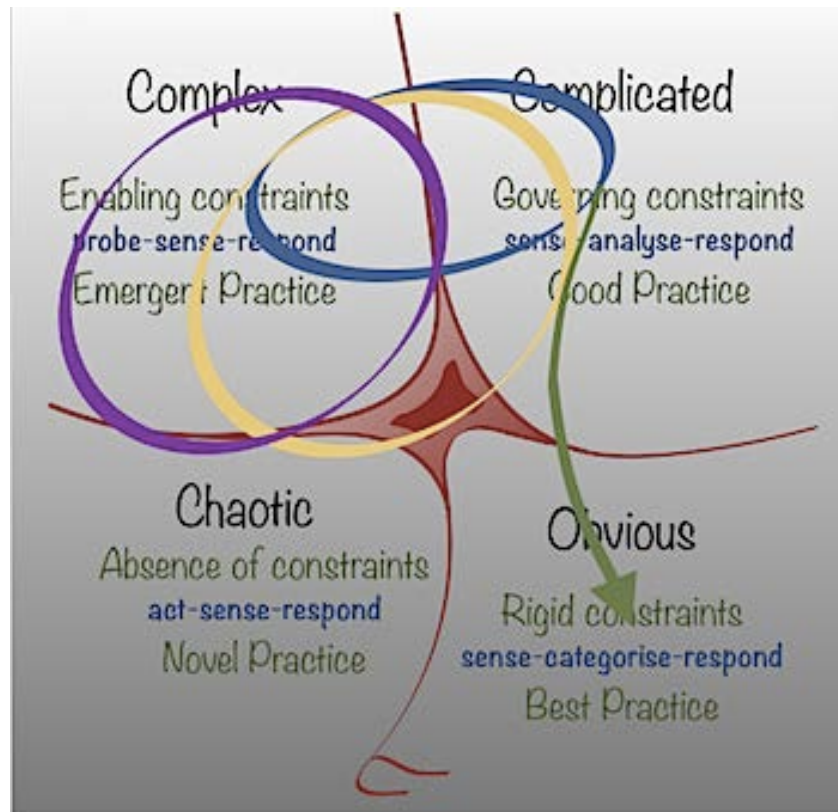


Figure 1. Cynefin Framework.³³

Oftentimes, first responders, as well as decision-makers in many varied types of organizations, will tend to apply a favored decision making method to different scenarios, despite the fact that different situations call for different decision making frameworks. Less skilled decision-makers may be loath to make a decision absent what they perceive is adequate information, or sufficient time to conduct an analysis. In a crisis, a first responder's failure to act swiftly will generally lead to poor outcomes. However, situations occur for which swift action without allowing appropriate time to observe, sense, collect relevant data, and analyze, is inappropriate and will generally only add to the chaos.³⁴ For instance, firefighters arriving at the scene of a structure fire with credible reports or signs of still savable people trapped within the building may be confronted

³³ Source: Dave Snowden, "Cynefin Dynamics," July 2, 2015, <http://cognitive-edge.com/blog/cynefin-dynamics/>.

³⁴ Richard B. Gasaway, *Fireground Command Decision Making: Understanding the Barriers Challenging Commander Situational Awareness* (Roseville, MN: Gasaway Consulting Group, LLC., 2009).

with a situation that involves any one of the Cynefin domains, or the situation may evolve from one to another during the course of the event. If the fire appears to be isolated to one room of a small private dwelling, the decision would generally be classified as *obvious*. Cause, effect, and the necessary steps to take are apparent to all involved. An intuitive, rapid decision would be made to categorize this event as demanding an immediate, aggressive interior attack with the intent of locating, confining, and extinguishing the fire, and simultaneously (or as swiftly as available resources allow), to search for and rescue the trapped occupants. However, if a few variables in this hypothetical scenario are changed, for example, the fire is in multiple rooms upon the arrival of the firefighters, the structure appears to be in danger of collapse, and reports as to the existence of trapped individuals are contradictory, the situation becomes *complicated*, and perhaps even *complex*.

Prior to deciding to risk their lives, or the lives of their subordinates, firefighters must first closely observe (sense) the fire conditions, the stability of the structure, and other factors, and then make a risk vs. reward decision (an analysis). What is the likelihood of savable individuals still being within this building? What are the chances that the building will collapse during the time that firefighters are operating inside? If, after this analysis (generally done very rapidly), the risk (to firefighters lives) is deemed worthy of the potential reward (saving people who *may* be in the building and who *might* still be alive by the time firefighters reach them), firefighters will respond by commencing an aggressive interior attack. Conversely, if the risk clearly outweighs the potential reward, firefighters will move more cautiously and less aggressively, perhaps deciding to attack the fire from a position of relative safety on the exterior of the building. Moreover, in certain scenarios, it will still be unclear after this rapid analysis, what to do. Colloquially, it is often referred to as “too close to call.” In these cases, the steps called for in *complicated* scenarios, sense and analyze, have not been sufficient to inform an appropriate decision, and therefore, this event has tipped over into *complexity*, for which the Cynefin framework maintains *probe-sense-respond* is appropriate.³⁵ This decision is very much in line with the decision that would be made by firefighters in these

³⁵ Snowden and Boone, “A Leader’s Framework for Decision Making.”

“too close to call” scenarios. Firefighters would likely probe, by advancing a hoseline near to the building, and perhaps just a few feet inside, to attempt a less than fully aggressive attack. If they sense that this probing (attempts at extinguishment) is being effective, with no adverse effects, such as signs of impending collapse, or if firefighters see or hear signs that live victims are actually trapped within the building, they will likely respond by transitioning to a more aggressive (risky) mode of attack.

It is difficult to conceive of a structure fire in a private dwelling that would be classified as being in the *chaotic* domain of the Cynefin framework. However, certainly a variety of events that have occurred in the past and will occur in the future at which first responders were and will be confronted with events, which are so novel and impactful, that they can only be classified as *chaotic*. The 911 attacks, Hurricane Katrina in 2005, and the Orlando nightclub attack, the worst mass shooting in the history of this nation,³⁶ are a few examples of chaotic scenarios, calling for an “*act-sense-respond*” method on the part of first responders. In such situations, the relationship between cause and effect is extremely unclear, and absolutely no script or protocol exists, which can be referred to, to guide all the decisions and the actions of the responders. Generally, in chaotic scenarios, skilled decision-makers will attempt to identify portions of the event that appear familiar, or at least less risky than other portions, and will act decisively in those specific areas, while closely monitoring the results of the actions, and adjusting as necessary.³⁷ When first responders are unaware that they are operating within a chaotic context, and therefore, attempt to apply decision making methods that may be appropriate for other Cynefin contexts, but which are inappropriate for the realm of the chaotic, it is likely that these decisions will result in more, not less chaos, and consequently, a greater likelihood of increased casualties and damage to property or the environment. As is discussed later, the degree to which first responders will be able to use the Cynefin framework as a problem-solving tool effectively appears to be correlated to individual levels of *sensemaking* skills, and *self-awareness*, among a host of many other cognitive abilities, which this thesis argues may be enhanced through *MT*.

³⁶ Jim McKay, “Was Orlando an Intelligence Failure,” *Emergency Management*, Summer 2016, 10.

³⁷ “The Cynefin Framework.”

C. SITUATIONAL AWARENESS VS. SENSEMAKING

What distinguishes great leaders from average leaders is their ability to perceive the nature of the game and the rules by which it is played, as they are playing it.

—Jaworski and Scharmer, *Leadership in the New Economy*

The importance of both SA (well known in the first responder community) and sensemaking (less well known) in the first-responder crisis decision making process cannot be overemphasized. SA and sensemaking hold many aspects in common; however, a variety of differences and nuances between sensemaking and SA should be considered in this thesis. First, the better-known SA is examined.

The phrase, *profession of arms*, can be used not only to refer to the military, but to the first responder community as well. In each of these professions, members have taken an oath to, as necessary, place themselves in harm's way to protect others. Often, members of the profession of arms must enter into hostile and dynamic environments with limited information as to the specifics of the particular threats that confront them. Similar to military members in battle overseas, for first responders at home in the United States, these threats may be not only in front of them, but all around them as well. Whether it is a battle with criminals or terrorists, natural disaster, massive civil unrest, a fire, explosion, hazardous materials incident, or many other scenarios, including a combination of the above, first responders are trained to “size-up” all “six-sides” of the scene continually; they assess what is all around them, including what is above and below them.

Accordingly, long ago, first responders wisely coopted from the military the term SA, and the importance of SA has been ingrained for many years in first responder training, operations, and culture. SA has been defined by Martha Dow, Len Garis, and Larry Thomas as “understanding the current environment and being able to accurately anticipate future problems to enable effective action,”³⁸ by Barry Boyce as “the initial awareness of one’s surroundings on a moment-by-moment basis as a precursor to

³⁸ Dow, Garis, and Thomas, *Reframing Situational Awareness within the Fire Service Culture*.

decision making under stress,”³⁹ and by Mica Endsley as “the perceptions of the elements in the environment within a volume of time and space. The comprehension of their meaning and the projection of their status in the near future.”⁴⁰ John Flach asserts that SA “calls attention to meaning-meaning not in terms of a particular individual’s interpretation but in terms of ‘what matters.’”⁴¹ First responders often use the term “size-up.” “Sizing-up” is the process used to gain SA, which Richard Gasaway has described as “the data gathering phase of the process that forms situational awareness.”⁴² SA is never complete until the incident has concluded (and often not even then), as it is impossible to know everything in an evolving scenario. Thus, size-up is continuous and ongoing.

It is helpful to consider Endsley’s description of SA as having three levels:

- Capturing cues and clues (perception)
- Processing cues and clues into meaning (comprehension)
- Predicting future events (highest level of SA)⁴³

Gasaway remarks that developing and maintaining SA “becomes the driving factor in the decision making process.”⁴⁴ The importance of good SA in the decision making process, as well as the description of *perception*, *comprehension*, and *prediction*, as three vital elements of SA, are common themes found in SA literature. These themes will prove salient upon examining the potential for MT to be worthwhile as a means for enhancing SA, and consequently, first-responder crisis decision making, later in the thesis. Next, this paper attempts to make some sense out of sensemaking.

³⁹ Barry Boyce, “Inhale, Exhale, Fight Fire,” *Mindful Magazine*, August 24, 2010, <http://www.mindful.org/inhale-exhale-fight-fire/>.

⁴⁰ Mica R. Endsley, “The Role of Situation Awareness in Naturalistic Decision Making,” in *Naturalistic Decision Making*, ed. Caroline E. Zsombok and Gary A. Klein (Mahwah, NJ: L. Erlbaum Associates, 1997), 270.

⁴¹ John M. Flach, “Situation Awareness: Proceed with Caution,” *Human Factors*, 37, no. 1 (1995): 151.

⁴² Gasaway, *Fireground Command Decision Making: Understanding the Barriers Challenging Commander Situational Awareness*.

⁴³ Endsley, “The Role of Situation Awareness in Naturalistic Decision Making.”

⁴⁴ Ibid.

Sensemaking is a term introduced by distinguished organizational theorist Dr. Karl Weick. He contends, “sensemaking is about such things as placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning.”⁴⁵ Weick goes on to say that sensemaking is not strictly cerebral, but invariably involves social and emotional components, and therefore, subjectivity. He clarifies, “The point we want to make here is that sensemaking is about plausibility, coherence, and reasonableness. Sensemaking is about accounts that are socially acceptable and credible.”⁴⁶

Fire Department of the City of New York (FDNY) Chief of Counterterrorism and Preparedness Joe Pfeifer describes sensemaking, as “the ability to construct meaning from the information received”⁴⁷ and Dr. Gary Klein, a renowned pioneer in the field of naturalistic decision making, who famously conducted studies of the ways in which firefighters make decisions in their natural environment, offered that sensemaking is “a motivated, continuous effort to understand connections (which can be among people, places, and events) in order to anticipate their trajectories and act effectively.”⁴⁸ Folsom, California police chief and scholar, Cynthia Renaud, places quite a bit of importance on the value of sensemaking for first responders who seek to restore order, and to save lives and property in chaotic situations.⁴⁹

Sensemaking is most often needed when a situation is in flux, when the pace of change is rapid, when outcomes are uncertain, and in particular, during events for which

⁴⁵ Karl Weick, *Sensemaking in Organizations* (Thousand Oaks, CA: Sage Publications, 1995), 6.

⁴⁶ Ibid.

⁴⁷ Joseph W. Pfeifer, “Command Resiliency: An Adaptive Response Strategy for Complex Incidents” (master’s thesis, Naval Postgraduate School, 2005).

⁴⁸ Gary Klein, Brian Moon, and Robert R. Hoffman, “Making Sense of Sensemaking 1: Alternative Perspectives,” *IEEE Intelligent Systems* 21, no. 4 (July–August 2006): 71, doi:10.1109/MIS.2006.75.

⁴⁹ Cynthia Renaud, “Making Sense in the Edge of Chaos” (master’s thesis, Naval Postgraduate School, 2010); Arjen Boin and Cynthia Renaud, “Orchestrating Joint Sensemaking across Government Levels: Challenges and Requirements for Crisis Leadership,” *Journal of Leadership Studies* 7, no. 3 (2013): 1–6, <http://onlinelibrary.wiley.com/doi/10.1002/jls.21296/pdf>.

the normal modes of operating are insufficient.⁵⁰ These types of events were referenced earlier, during the discussion of the Cynefin framework. Dr. Christopher Bellavita, Director of Academic Programs for the Naval Postgraduate School's Center for Homeland Defense and Security, speaks of "the chaotic: a space so turbulent that cause and effect are unknown; strategically [and this thesis posits perhaps tactically as well] it is not clear what to do with any measure of certainty."⁵¹ Experienced first responders know that most crises tend to fit into frames, or patterns, that can be recognized and to which tried and true procedures can be applied. These types of crises are at times fairly simple, and at other times, will be complicated or even complex. However, in these cases, experienced responders are able to recognize (consciously or unconsciously), a pattern, which aids greatly in the decision making process. This "*recognition-primed decision making*" is discussed in detail later in the thesis. On the other hand, certain crises that first responders encounter will be novel, even chaotic, and in these instances, responders will be unable to recognize any pattern. It is during these types of events when the sensemaking process is most valuable. A distinctive aspect of sensemaking, Weick emphasizes, is that "People learn about situations by acting in them and then seeing what happens."⁵² This probing, assessing, and readjusting technique has often been referred to by Dr. Bellavita as a "ready, fire, aim"⁵³ approach. This approach is intuitively utilized by children, who learn which behaviors are and are not acceptable to their parents by testing boundaries and monitoring the point at which a stern warning or discipline results.

A ready, fire, aim approach would obviously be far more risky for a lone police officer confronted with a "shoot-don't shoot" scenario, a police IC directing the actions of first responders during a standoff or hostage event, or a fire IC orchestrating an interior attack on a large structural fire. Nonetheless, first responders are typically well aware of

⁵⁰ Deborah Ancona, "Chap 1: Sensemaking: Framing and Acting in the Unknown," in *The Handbook for Teaching Leadership: Knowing, Doing, and Being*, ed. Scott Snook, Nitin Nohria, and Rakesh Khurana (Thousand Oaks, CA: Sage Publications, 2012).

⁵¹ Marc Revere, "'Sensemaking' and Its Effect on Firefighter and Fire Officer Decisions," *Firefighter Nation*, October 2, 2012, <http://www.firefighternation.com/article/command-and-leadership/sensemaking-and-its-effect-firefighter-and-fire-officer-decisions>.

⁵² Weick, *Sensemaking in Organization*, 14.

⁵³ Christopher Bellavita, "Changing Homeland Security: What Is Homeland Security?" *Homeland Security Affairs*, June 1, 2008, 5, <https://www.hasj.org/articles/118>.

the dangers of “paralysis by analysis” in such scenarios. ICs are trained and conditioned to make decisions absent all the available information in these dynamic situations. A fire chief will rapidly deploy firefighters to various locations in and around a structure fire, and will then continually evaluate the results of the firefighting efforts, simultaneously with assessment of the progress of the fire and the stability of the building. As the fire chief receives information from his own observations, from firefighters reporting back via radio on the conditions they are experiencing within the structure, and from a multiplicity of other sources, the chief will constantly balance risk vs. reward. What are the chances of savable lives still being at risk within this structure? How valuable is the building? Is the fire in danger of spreading to nearby structures? Does the building contain hazardous materials or any other unique hazards? What are the risks of the building collapsing as firefighters operate within or around it? If the fire appears to be “darkening down” as water is applied by firefighters, and if the structure continues to appear to be stable, the chief will most likely allow aggressive interior firefighting to continue, and may even direct additional fire companies to enter the structure. Conversely, if the fire continues to grow larger even after water is being applied, or if the structure appears to become compromised and in danger of collapse, the chief will be far more likely to withdraw interior forces. Adding to the complexity of this sensemaking on the part of the IC will be an array of other continually changing, and subtle factors, such as weather conditions, the color, volume, and behavior of smoke, tone of the firefighters’ voices as they communicate via radio from the interior, and even the behavior of onlookers.

SA and sensemaking then, are intricately related, yet not the same. SA is a noun, a mental state that the decision maker attempts to arrive at and to maintain through the process of size-up. Size-up, a verb, consists of primarily observation, albeit a very focused and active style of observation. Sensemaking, also a verb, involves observation, as well as participation. A constant process of sizing-up, in pursuit of a never fully attainable SA is one component of sensemaking. However, sensemaking involves far more, and is more nuanced and complex, than simply striving for SA. The analogy of standing on a balcony and observing a dance below, offered by Ron Heifetz, is apt here.

Heifetz maintains a need exists for a leader who must make decisions involving complex situations, to leave the crowded and chaotic dance floor and retreat to the balcony to “get far enough above the fray to see the key patterns.”⁵⁴ Heifetz’s point is a valid one. However, it is important to understand that, metaphorically speaking, although a view from the balcony may provide far greater SA than would the view from the chaotic dance floor, individuals are not always limited to an either/or choice. Heifetz would likely agree that oftentimes, the more effective manner in which to gain the awareness and understanding needed to solve a problem or resolve a crisis is to alternate, at discrete intervals, time spent on the balcony, above the fray, with time spent participating in the chaos on the dance floor below. This scenario represents sensemaking.

Sensemaking presents potential benefits to first responders beyond ingrained “sizing-up” to attain SA. Size-up and SA are elements of sensemaking. Sensemaking may serve as an element of SA as well. Sensemaking, though, is far more complex than SA and more difficult to engage in effectively. Sensemaking is not always necessary to arrive at a state of SA, but it is necessary when novelty, complexity, chaos, or disorder begin to encroach.

The term sensemaking, unlike SA, is not yet ingrained in first responder training, operations, and culture. However, it is clear that first responders (particularly those tasked with the role of IC) engage in both SA and sensemaking during crises, whether they are fully conscious of the distinction between the two. Raising first responder awareness and understanding regarding the sensemaking process would likely result in improved outcomes during operations in the initial phase of crisis events. The criticality of SA and sensemaking in those processes will be apparent as the discussion turns to crisis decision making frameworks. Later in the thesis, evidence is offered proposing *mindfulness* (“enhanced through MT” to be exceptionally beneficial to responders seeking to make sense, and to gain and maintain the best possible SA during crisis scenarios.

⁵⁴ Ron Heifetz, *Leadership without Easy Answers* (New York: Harvard University Press, 1998), 253.

D. TRADITIONAL VS. NATURALISTIC PARADIGM OF DECISION MAKING

The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.

—Albert Einstein 1879–1955

More often than not, first responders have limited time in which to make crisis decisions, and have only meager, inconsistent, or unreliable information on which to base these decisions. These decisions are usually high stakes decisions often made during physical exertion, in dangerous environments, and while being exposed to a variety of sights, sounds, and even smells that add extreme emotional stress. First responders employ two very different types of decision making, depending on circumstances: *analytical* and *intuitive*.⁵⁵ Pfeifer explains, “Examination of critical decision making shows that emergency responders combine quick intuition with experience and knowledge to adapt to evolving situations; yet, in the presence of novelty, they may also use deliberate analytical thinking.”⁵⁶ See Figure 2.

⁵⁵ Gary Klein. *Human Factors* 50, no. 3 (June 2008): 456–60.

⁵⁶ Pfeifer, *Crisis Leadership: The Art of Adapting to Extreme Events*, 6, as cited in Joseph Pfeifer and James Merlo, “The Decisive Moment: The Science of Decision Making under Stress,” in *Leadership in Dangerous Situation: A Handbook for the Armed Forces, Emergency Services and First Responders*, ed. P. Sweeney, M. Matthew, and P. Lester (Annapolis, MD: Naval Press, 2011), 230–248.

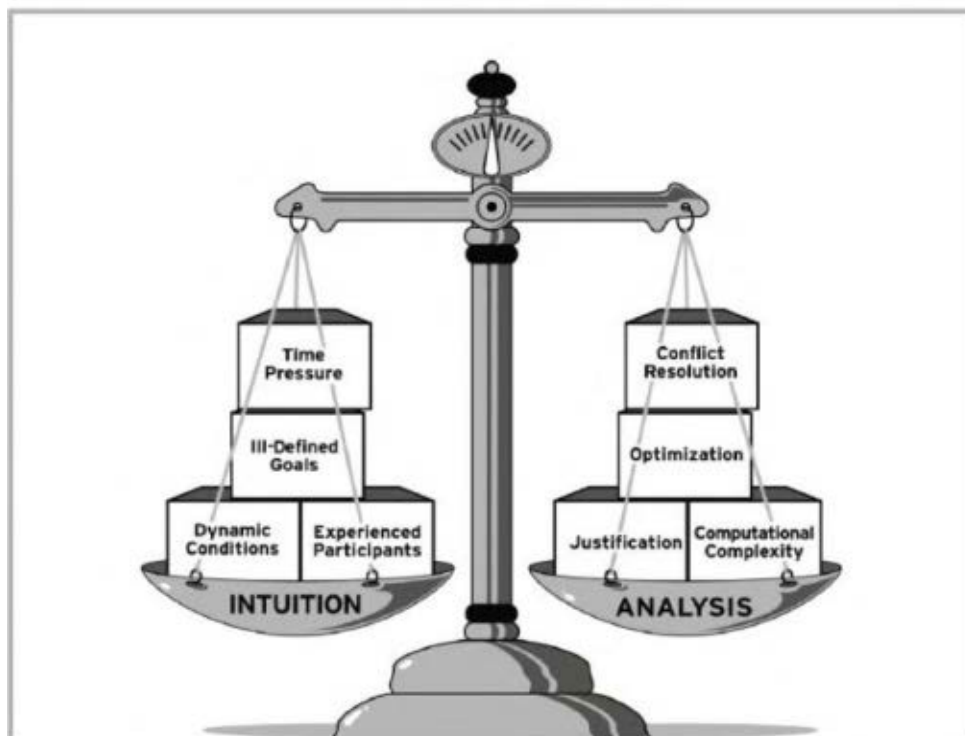


Figure 2. Conditions Favoring Intuitive and Analytical Approaches.⁵⁷

This thesis proposes that the manner in which first responders generally make decisions during crisis events is most appropriately considered within what is referred to in decision making research as the *naturalistic decision making* (NDM) paradigm. Klein, et al. posit that naturalistic decision making has four primary components: “dynamic and continually changing conditions, real-time reactions to these changes, ill-defined goals and ill-structured tasks, and knowledgeable people.”⁵⁸

Research has revealed that in a wide variety of naturalistic settings, “recognitional (intuitive) decision strategies are used more frequently than analytical strategies, even for difficult cases.”⁵⁹ Although as many as nine NDM models have been developed,⁶⁰

⁵⁷ Source: Gary Klein, *The Power of Intuition* (New York: Doubleday, 2003), 67.

⁵⁸ Gary A. Klein, Judith Orasanu, and Robert Calderwood, *Decision-Making in Action: Models and Methods* (Norwood, NJ: Ablex Publishing Corp., 1993), vii.

⁵⁹ *Ibid.*, 147.

⁶⁰ Raanan Lipschitz, “Converging Themes in the Study of Decision Making in Realistic Settings,” in *Decision Making in Action: Models and Methods*, ed. Gary A. Klein et al. (Norwood, NJ: Ablex, 1993), 103–137.

Klein's *recognition-primed decision* (RPD) model of rapid decision making, which was devised as the result of a study of how individuals formulate decisions under time pressure, appears to be particularly relevant to first-responder crisis decision making. Klein's study, conducted at the behest of the U.S. Army Research Institute for the Behavioral and Social Sciences, consisted of years of observations of and interviews with fireground commanders, Army tank commanders, operating room staff, and others working in similar dynamic, high stakes, and time constrained environments with inconsistent or limited information upon which to base their decisions.⁶¹ This study concluded that at least 80% of the decisions made by individuals in these occupations were recognitional (intuitive) rather than comparative (analytical) or creative.⁶² Other NDM researchers have focused on decision making in similar environments. The RPD model, which began to emerge in 1986, blends two methods: "the way decision-makers size up the situation to recognize which course of action makes sense, and the way they evaluate that course of action by imagining it."⁶³ Klein asserts, "By recognizing a situation as typical, they also recognized a *course of action* likely to succeed. The recognition of goals, cues, expectancies, and actions is part of what it means to recognize the situation."⁶⁴ RPD involves a decision-maker comparing options to a particular situation, one at a time (intuitively), as opposed to comparing those options to one another (analytically), which would take far too much time for a crisis or emergency situation. This singular evaluation strategy is linked to the research of Nobel Prize winner Herbert Simon, who coined the term, *satisficing*, and contrasted it to *optimizing*.⁶⁵ Satisficing involves selecting the first strategy that works, and thus, is much more efficient in terms of time and resources than is optimizing, which seeks to select the best possible strategy. It is rarely, if ever, wise for first responders to seek to optimize their decisions during a crisis situation. Klein points out that this singular evaluation strategy

⁶¹ Klein et al., *Decision-Making in Action: Models and Methods*.

⁶² Ibid.

⁶³ Ibid., 24.

⁶⁴ Ibid.

⁶⁵ Herbert A. Simon, *Models of Man: Social and Rational* (New York: Wiley, 1957), as referenced in Gary Klein, *Sources of Power* (Cambridge, MA: The MIT Press, 1998), 20.

involves the use of imagination, or mental simulation, on the part of the decision-maker, who envisions how a particular course of action will affect a problem, and makes adjustments “on-the-fly” as the situation unfolds.⁶⁶ Therefore, it can be seen that although RPD is more intuitive than analytical, it actually blends intuition and analysis, as seen in Figure 3. Intuition is utilized during pattern matching, and a more deliberate analysis comes into play during mental simulation. RPD proposes that although it is clearly not an infallible method of decision making, it is generally better than any other type in these scenarios.

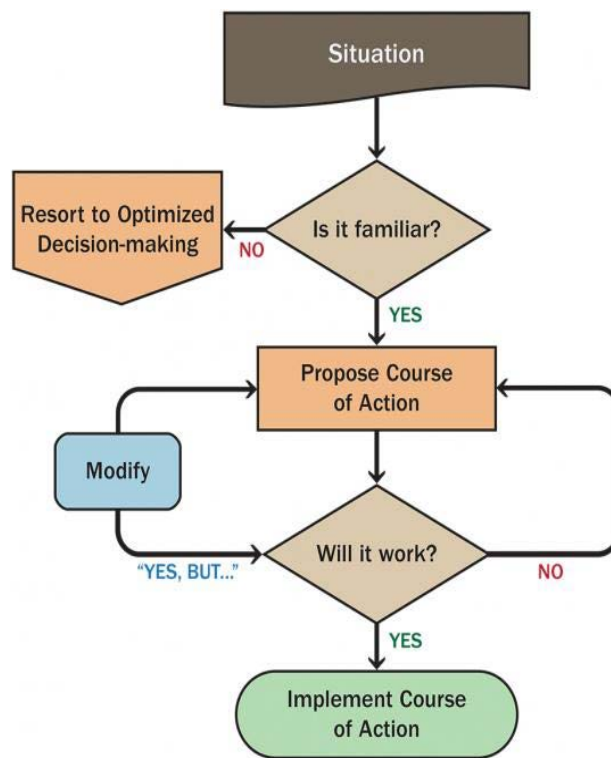


Figure 3. Expert Decision making Model Based on the Recognition-Primed Decision Model Pioneered by Research Psychologist Gary Klein.⁶⁷

Since 1986, a variety of other NDM studies have focused on crisis decision making environments, including crisis decisions made by law enforcement officers,

⁶⁶ Klein et al., *Decision-Making in Action: Models and Methods*.

⁶⁷ Source: “Decisions Flowchart,” September 2015, http://aviationweek.com/site-files/aviationweek.com/files/uploads/2015/09/Decisions_Flowchart.jpg.

neonatal intensive care nurses, submarine commanders, fighter pilots, and others who have validated the research and conclusions of Klein and his associates.⁶⁸ It is also interesting to note that the United States Marine Corps has incorporated RPD into their modern day doctrine. Marines share the need with first responders to operate in dynamic, high stakes, and time constrained environments with inconsistent or limited information upon which to base their decisions. Marine Corps doctrine posits that intuitive decision making “rejects the computational approach of the analytical method” [and instead] “replaces methodical analysis with an intuitive skill pattern recognition based on experience and judgment.”⁶⁹

Klein points out, “NDM is concerned with decisions made by individuals who know a lot about the problem domain. That does not mean they are expert decision-makers (such as decision analysts), but they are familiar with the tools and information sources relevant to making a decision.”⁷⁰ This distinction should be kept in mind as the reader considers the arguments offered in this thesis. It is clear that the methods (such as they are) used by novice decision-makers do not correspond to any particular framework or model, and therefore, the conclusions arrived at herein do not necessarily apply to novice decision-makers. It is also imperative to note that the research for this thesis looked at decision making as not a standalone task or event but rather, as “a means of achieving a broader goal.”⁷¹ The types of decisions that the research for this thesis considered were not those in which a decision-maker is presented with an established set of options, considers the potential benefits and pitfalls of each, and then makes a choice. Rather, this thesis concerns itself with decisions of necessity “embedded in task cycles that consist of defining what the problem is, understanding what a reasonable solution would look like, taking action to reach that goal, and evaluating the effects of that

⁶⁸ Gasaway, *Fireground Command Decision Making: Understanding the Barriers Challenging Commander Situational Awareness*.

⁶⁹ Headquarters, United States Marine Corps, *Command and Control MCDP 6* (Washington, DC: Department of the Navy, 1996), 102, <https://fas.org/irp/doddir/usmc/mcdp6.pdf>.

⁷⁰ Klein et al., *Decision-Making in Action: Models and Methods*, 11.

⁷¹ Klein et al., *Decision-Making in Action: Models and Methods*.

action.”⁷² During crises, first responders do not set out to *make decisions*. Rather, they are attempting to *solve problems*. Typical crisis decisions made by first responders are pieces of a larger undertaking, not ends unto themselves. Therefore, as the reader analyzes the evidence presented herein for the potential of MT as a worthwhile means to enhance first-responder crisis decision making, this decision making should not be thought of as a standalone task, or in a vacuum, but rather as an integral component of a complex activity.

Certainly, the classical/traditional paradigm of decision making is relevant to many aspects of first responder decision making. For instance, an analytical approach generally has merit in situations in which decision-makers are inexperienced or in which they are confronted with novel problems. Furthermore, those holding leadership positions within law enforcement, fire service, or emergency medical service agencies who are tasked with duties and responsibilities that involve decision making concerning such matters as specification and purchasing of vehicles and equipment, budgeting, strategic planning, rendering decisions in disciplinary and other personnel matters, and in many other scenarios, would very likely engage in decision making taking the form of a classical, analytical approach, as opposed to the more naturalistic, intuitive approach. However, this thesis argues that the decision making paradigm that is overwhelmingly (and appropriately, albeit perhaps often unconsciously) engaged in by first responders during crisis events is NDM, and in particular, RPD.

E. BOYD’S OODA LOOP

Between stimulus and response there is a space. In that space is our power to choose our response. In our response lies our growth and our freedom.

—Viktor E. Frankl, *Man’s Search for Meaning*

The observe, orient, decide, and act (OODA) loop, also known as Boyd’s loop, created by the late United States Air Force (USAF) colonel John R. Boyd (1927–1997), is a widely accepted decision making framework that is likely more familiar to members of

⁷² Ibid., 6.

law enforcement than to firefighters or EMS providers. The reason for this lies in the fact that the OODA loop was designed to teach and enhance decision making specifically to members of the military, to prepare them for success during wartime conflict with a thinking, adaptable adversary. OODA was later adapted by law enforcement as a conflict decision making aid.⁷³ The term “loop” is used because the OODA loop is designed as a cycle that should be looped through over and over again until the objective is reached, as depicted in Figure 4.

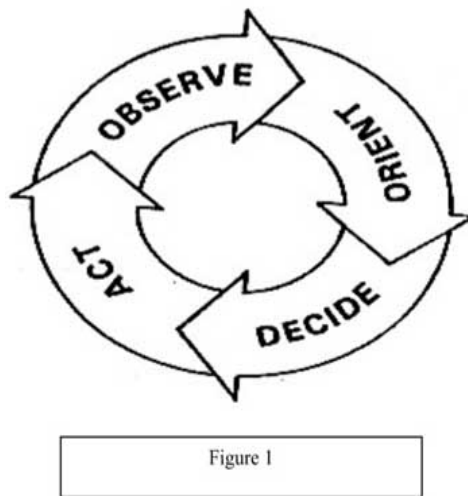


Figure 4. OODA Loop.⁷⁴

Although Figure 4 is the manner in which Boyd’s OODA loop is often depicted, Richards J. Heuer, Jr. observes that Figure 5 is the only OODA “loop” that Boyd actually drew.⁷⁵

⁷³ Kevin J. Walsh and Vincent E. Henry, “Compstat, OODA Loops and Police Performance Management,” *Policing* 2, no. 3 (2008): 349–358, doi:10.1093/police/pan046.

⁷⁴ Source: Donald E. Vandergriff, “Unlocking the Power of Colonel John Boyd’s OODA Loop,” Project on Government Oversight, April 28, 2015, <http://www.pogo.org/strauss/issues/military-people-and-ideas/2015/unlocking-the-power-of-john-boyd-ooda-loop.html?referrer=https://www.google.com/>.

⁷⁵ Chet Richards, *Boyd’s OODA Loop (It’s Not What You Think)* (Atlanta: J. Addams & Partners, Inc., 2012), http://www.jvm-inc.com/boydsrealloda_loop.pdf.

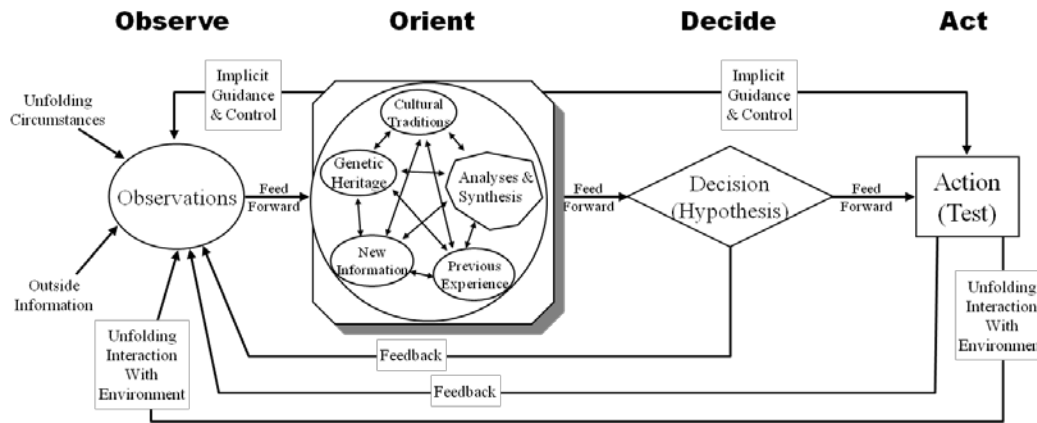


Figure 5. OODA As Illustrated by Boyd.⁷⁶

In attempting to explain how this more intricate OODA loop should be understood, Heuer suggests people should, “begin with the centrality of orientation [and that] Orientation is an ancient idea, embodied in the concept of *mindfulness* (emphasis added), but it is as modern as fighter pilots, who talk about maintaining ‘situation awareness’.”⁷⁷ [He continues] “What this emphasis on orientation does is make conflict into a learning contest to better maintain *awareness* (emphasis added) of the world, of, as Collins (2001) called it, the brutal facts.”⁷⁸

Despite its more common use among members of the law enforcement and military communities, Boyd’s loop might also serve as a helpful crisis decision making framework, or tool, for firefighters and EMS providers as well. Although firefighters and EMS responders rarely engage in conflict with a thinking adversary, they nonetheless regularly take part in two-sided “battles” with fires, medical emergencies, and a host of emergencies and natural disasters. Certainly, the “enemy” in these battles is rarely a thinking adversary. Nevertheless, the various crises at which first responders must attempt to create order from chaos generally tend to “react” to the actions taken by first responders, necessitating a constant OODA cycle on their part. Klein seems to agree, noting despite the differences between military commanders and firefighters in regard to

⁷⁶ Source: Vandergriff, “Unlocking the Power of Colonel John Boyd’s OODA Loop.”

⁷⁷ Richards, *Boyd’s OODA Loop (It’s Not What You Think)*, 10–11.

⁷⁸ Ibid., 11.

confrontation with an intelligent adversary, military commanders nonetheless employ the same strategies as [do] fireground commanders.⁷⁹ This thesis later “loops” back to an analysis of specifically how MT may enable first responders to grasp the power of Boyd’s OODA cycle more fully during crisis events.

F. COGNITIVE BIAS

The eye sees only what the mind is prepared to comprehend.

—Potter, *The White Bedouin*

Cognitive bias is a “genuine deficiency or limitation in our thinking—a flaw in judgment that arises from errors of memory, social attribution, and miscalculations (such as statistical errors or a false sense of probability).”⁸⁰ Although many authorities believe that cognitive bias enables more rapid and effective decision making in certain scenarios, particularly during crises,⁸¹ ample evidence also demonstrates that unconscious cognitive biases have very significant negative impacts upon first-responder crisis decision making. Bias frequently invades first responder SA, sensemaking, and decision making in a variety of ways. Pfeifer, in *Crisis Leadership: The Art of Adapting to Extreme Events*, discusses the psychological and cognitive forces acting upon First Responders ability to make crisis decisions. Pfeifer comments, *cognitive biases* may “restrict their [First Responders] judgment and...dangerously affect their ability to make critical decisions.”⁸² Similarly, Dr. Robert Fitch, a police lieutenant, as well as a Professor of Psychology, examines the influence of cognitive biases in negatively impacting decisions made by law enforcement officers. Fitch holds that humans are prone to a variety of unconscious biases that often override rational, objective thought processes, resulting in faulty

⁷⁹ Klein, *Sources of Power*.

⁸⁰ George Dvorsky, “The 12 Cognitive Biases that Prevent You from Being Rational,” January 9, 2013, <http://io9.com/5974468/the-most-common-cognitive-biases-that-prevent-you-from-being-rational>.

⁸¹ Ibid.

⁸² Pfeifer, *Crisis Leadership: The Art of Adapting to Extreme Events*, 3.

judgment.⁸³ Atsuo Murata et al. contend cognitive biases harm decision making and lead to mistakes that result in negative outcomes that are pervasive in a wide variety of crisis scenarios.⁸⁴ *Cognitive bias* refers to a category of generally unconscious biases that should not be misconstrued with the types of bias denoted by a negative connotation, such as prejudice, bigotry, favoritism, or intolerance. Retired Central Intelligence Agency intelligence analyst Richards Heuer notes:

It is important to distinguish cognitive biases from other forms of bias, such as cultural bias, organizational bias, or bias that results from one's own self-interest. In other words, a cognitive bias does not result from any emotional or intellectual predisposition toward a certain judgment, but rather from subconscious mental procedures for processing information.⁸⁵

In *Thinking Fast and Slow*, Nobel Prize winner Daniel Kahneman provides an extensive and comprehensive discussion concerning the manner in which various cognitive biases result in decision making errors. Kahneman argues, “there are distinctive patterns in the errors people make. Systematic errors are known as biases, and they recur predictably in particular circumstances.”⁸⁶ Kahneman points out that cognitive biases emanate from a dependence on *judgmental heuristics*, which are “simple procedure(s) that help find adequate, though often imperfect, answers to difficult questions.”⁸⁷ Heuristics often emanate from individual trial and error or experimentation. These heuristics are basically rules of thumb that are generally effective, yet prone to errors, which are predictable.⁸⁸ For instance, if someone has tried sushi two or three times, and if on each of these occasions, that person felt ill the next day, said person may be likely to develop a bias against sushi, and in the future, would choose not to eat it. Perhaps, upon

⁸³ Brian Fitch, “Good Decisions: Tips and Strategies for Avoiding Psychological Traps,” *FBI Law Enforcement Bulletin* 79, no. 6 (June 2010).

⁸⁴ Atsuo Murata, Tomoko Nakamura, and Waldemar Karwowski, “Influence of Cognitive Biases in Distorting Decision Making and Leading to Critical Unfavorable Incidents,” *Safety* 1, no. 1 (2015): 47, doi:10.3390/safety1010044.

⁸⁵ Richards J. Heuer, Jr., *Psychology of Intelligence Analysis* (Washington, DC: Center for the Study of Intelligence, 1999), ch. 9, 1, Kindle edition.

⁸⁶ Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar, Straus, and Giroux, 2011).

⁸⁷ *Ibid.*, 98.

⁸⁸ *Ibid.*

trying sushi again from a different establishment, this same person might enjoy it very much, or perhaps not. The person's bias against sushi may be an "error," and it may be "unfair" to the proprietor's of sushi establishments who will never enjoy the benefit of that person's business, or company. If that person never eats sushi again, it will never be known if this "heuristic" that the person is employing is serving that particular person well or not. However, the decision to refrain from ever eating sushi again, while possibly an error, is nonetheless a rational one, and is made with no ill intentions. Kahneman's nuanced discussion of the negative effects of heuristics upon decision making is extremely relevant for consideration in the context of this thesis, particularly in light of the previous assertion herein that the decision making paradigm overwhelmingly (and appropriately), engaged in by first responders during crisis events is Klein's RPD. At first glance, these two models appear to contradict one another. In fact, Kahneman points out, "The NDMers adamantly reject the Focus on biases in the heuristics and biases approach. They criticize this model as overly concerned with failure and driven by artificial experiments rather than by the study of real people doing things that matter."⁸⁹ Interestingly, in an attempt to resolve this contradiction, Klein and Kahneman eventually agreed to an "adversarial collaboration" on a lengthy research project designed to answer the question, "*When can you trust an experienced professional who claims to have an intuition?*"⁹⁰ Kahneman's succinct definition of intuition was "knowing without knowing how you know."⁹¹ This research produced a journal article with a somewhat revealing title, "Conditions for Intuitive Expertise: A Failure to Disagree."⁹² The article answered the question, *when can you trust an experienced professional who claims to have an intuition*, by proposing the idea that the expert's confidence (very often the result of *overconfidence bias*) should be generally disregarded, but rather, the focus should be placed upon the particular context of the intuition in question. It essentially boils down to two fundamental conditions for development of a skill:

⁸⁹ Kahneman, *Thinking Fast and Slow*, 234–5.

⁹⁰ Ibid., 235.

⁹¹ Ibid.

⁹² Ibid., 234.

- an environment that is sufficiently regular to be predictable, and
- an opportunity to learn these regularities through prolonged practice.⁹³

For instance, an experienced paramedic working in a busy urban setting would be far more likely to possess sound intuition in relation to decisions made in caring for a critically injured patient than would an experienced political scientist, who by nature of the unpredictable environment toiled in, and lengthy wait times for feedback on the correctness of predictions made, is far less able to develop trustworthy intuition in regard to decisions that must be made regarding the analysis of various political crises. Or, more simply, all other things being equal, a paramedic working for many years in a busy setting in which the opportunity is presented to care for multiple critical patients each day would be more likely to possess sound intuition than would a paramedic working in a less busy setting for the same number of years.

Gasaway discusses empirical studies that have demonstrated “barriers... [many of which may appropriately be described as biases] that can impact situational awareness and contribute to errors in decision making.”⁹⁴ Among these barriers and biases, Gasaway explores several situations in which first responders acting in the capacity of incident commander, “experienced flawed perceptions of reality by concluding the incident they were responding to would be very similar to dozens, if not hundreds, of previous incidents they commanded.”⁹⁵ He correctly labels these barriers as *normalcy bias*.

Normalcy bias appears to be a cognitive trap commonly experienced by experienced first responders in the course of crisis decision making. Pfeifer reports, “In a crisis, novelty demands that responders swiftly adapt to new threats, but too frequently they fall victim to cognitive biases by *overweighing* experience and *framing* extreme events as routine. This *normalcy bias* (Kahneman, 1982) combined with heuristic

⁹³ Ibid., 240.

⁹⁴ Gasaway, *Fireground Command Decision Making: Understanding the Barriers Challenging Commander Situational Awareness*, 129.

⁹⁵ Ibid., 347.

shortcuts blinds emergency responders from seeing the event as a crisis.”⁹⁶ Conversely, Dan Ariely comments that *expectation bias* may result in situations in which first responders incorrectly react to a “normal” situation as if it were a crisis, such as in the tragic 1999 case of the shooting of Amadou Diallo in New York City. Diallo was “an unarmed, 23-year old immigrant from Guinea who was shot 41 times by four white New York City police officers who believed that when he reached for his wallet, he was reaching for a gun.”⁹⁷ Ariely points to “studies [that] confirm these [expectancy] biases were to blame in other recent shootings of unarmed black men” [and that an individual need not] “be an overt racist to fall victim to these negative and incorrect expectations.”⁹⁸ In fact, this thesis maintains that this type of unconscious cognitive bias, as opposed to any sort of ill-intentioned, conscious bias, prejudice, or racism, is very likely a major contributing factor in many of the recent controversial and notorious cases of police use of force, including shootings of unarmed individuals, in which the widespread perception has been that the actions of the officers were not reasonable or justified. Media attention to these incidents has resulted in public outcry and significant civil and social unrest across the nation, including attacks against police officers.⁹⁹ Of course, each of these generally complex, or even chaotic incidents must be analyzed individually, and it is not the purview of this thesis to attempt to judge the actions of the officers in these cases, other than to point out the likely correlation with cognitive bias in many of these events, and later, to analyze whether the application of MT may attenuate the negative effects of unconscious bias at similar incidents in the future.

In addition to the above *normalcy bias*, *over-confidence bias*, and *expectancy bias*, first-responder crisis decision making has been shown to suffer from a variety of other cognitive biases. Kahneman provides a complex discussion of a broad range of cognitive biases, many of which have been known to impact the decisions made by first responders at crisis events negatively. Chief among these biases is one to which

⁹⁶ Pfeifer, *Crisis Leadership: The Art of Adapting to Extreme Events*, 3.

⁹⁷ Dan Ariely, *Summary of Predictably Irrational* (Instaread, 2016), Kindle edition.

⁹⁸ Ariely, *Summary of Predictably Irrational*.

⁹⁹ Altman, “Person of the Year: The Short List, No. 4: Black Lives Matter.”

Kahneman has assigned a lengthy acronym: “WYSIATI... what you see is all there is.”¹⁰⁰ He emphasizes the importance of WYSIATI, “jumping to conclusions on the basis of limited evidence,” to a comprehension of intuitive thinking.¹⁰¹ The more well-known *confirmation bias*, a phenomenon wherein decision-makers tend to focus on and to give more weight to evidence that confirms their initial belief, and to discount or ignore evidence that contradicts their initial belief,¹⁰² is also often a bias at play that tends to impact crisis decision making negatively. The list of particular cognitive biases that might potentially impact the decisions of first responders as they struggle to make decisions that will transition chaotic or complex scenarios to a state of calm, includes those biases such as *cognitive narrowing*,¹⁰³ *availability heuristic*, *bandwagon effect*, *outcome bias*, *salience bias*, *gambler’s fallacy*, *curse of knowledge*, *framing*, *elective attention*, *information overload*, *emotions*, and on and on.¹⁰⁴

Appropriate, effective training and education is essential in the effort to assist first responders in recognizing the variety of biases that may confront their decision making processes during a crisis. While not a panacea, MT appears to have good potential to assist with the mitigation of the negative effects of cognitive bias. Later in the thesis, after MT has been examined, the specific evidence for the benefits of MT toward mitigating cognitive bias are presented and analyzed.

G. INFLUENCE OF STRESS

The portion of this thesis research in regard to the effects of stress upon first-responder crisis decision making is summarized well by Kathleen Kowalski and Charles Vaught, who write, “The relationship of stress to judgment and decision making is an aspect of human behavior that remains relatively unexplored (Hammond, Gillis, 1993).

¹⁰⁰ Kahneman, *Thinking Fast and Slow*, 86.

¹⁰¹ Ibid.

¹⁰² “Confirmation Bias,” accessed March 21, 2016, https://www.sciencedaily.com/terms/confirmation_bias.htm.

¹⁰³ Kahneman, *Thinking Fast and Slow*.

¹⁰⁴ Kai Musashi, *The 25 Cognitive Biases* (Middletown, DE: n.p., 2016).

Consequently, the literature in this area is limited and not always conclusive.”¹⁰⁵ This gap in the literature is surprising in light of the abundance of research that has been conducted, which explores the effects of stress upon first responders’ physical and emotional health. In particular, the area of posttraumatic stress disorder (PTSD) has been widely discussed¹⁰⁶ in academic, scientific, first responder, and military communities yet not, apparently, the specific area of the effects of stress upon crisis decision making.

A widely referenced definition of *stress* is, “a process by which certain work demands evoke an appraisal process in which perceived demands exceed resources and result in undesirable physiological, emotional, cognitive and social changes.”¹⁰⁷ Another definition of stress, which is quite relevant to this thesis topic is:

A high demand, high threat situation that disrupts performance. It is time-limited, events occur suddenly and often unexpectedly, quick and effective task performance is critical, and consequences of poor performance are immediate and often catastrophic.....it is also important to note that stress is a multidimensional construct, and this *general term may be used to refer to any number of specific stressors or demands that may be present in a given task setting, including stressors such as noise, threat, time pressure, task load, coordination requirements, fatigue, and other task and environmental demands* (emphasis added).¹⁰⁸

So, for the purpose of this thesis, the term stress refers to the many different, “stressors and demands” which have the potential to affect crisis decision making in negative ways.

¹⁰⁵ Kathleen M. Kowalski and Charles Vaught, *Judgment and Decision Making under Stress: An Overview for Emergency Managers* (Pittsburg, PA: National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, n.d.), 2, <https://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/jadmus.pdf>.

¹⁰⁶ For example, see Johnathan I. Bisson, “Post-traumatic Stress Disorder,” *Occup Med (Lond)* 57, no. 6 (2007): 399–403, <http://occmed.oxfordjournals.org/content/57/6/399.short>; Tyler C. Smith et al., “PTSD Prevalence, Associated Exposures, and Functional Health Outcomes in a Large, Population Based Military Cohort,” *Public Health Rep* 124, no. 1 (January–February 2009): 90–102; Carol S. Fullerton, Robert J. Ursano, and Leming Wang, “Acute Stress Disorder, Posttraumatic Stress Disorder, and Depression in Disaster or Rescue Workers,” *The American Journal of Psychiatry* 131, no. 8 (August 2004): 1370–1376, <http://ajp.psychiatryonline.org/doi/abs/10.1176/appi.ajp.161.8.1370>.

¹⁰⁷ Eduardo Salas, James E. Driskell, and Sandra Hughes, “The Study of Stress and Human Performance,” in *Stress and Human Performance*, ed. James E. Driskell and Eduardo Salas (Mahwah, NJ: Lawrence Erlbaum Associates, 1996), 1–45.

¹⁰⁸ James E. Driskell et al., “Chapter 14, Stress Exposure Training: An Event-Based Approach,” in *Performance under Stress*, ed. James L. Szalma and Peter A Hancock (Burlington, VT: Ashgate Publishing, 2008), 271.

James Szalma and Peter Hancock note the importance of getting ready to prevent or at least to mitigate against the negative effects of stress by emphasizing several of the specific negative consequences, stating,

Failure to prepare for these conditions can exact a high price. Stress may result in *physiological changes* such as increased heart beat, labored breathing, and trembling; *emotional reactions* such as fear, anxiety, frustration; *cognitive effects* such as narrowed attention, decreased search behavior, longer reaction time to peripheral cues and decreased vigilance; and social effects such as a loss of team perspective.¹⁰⁹

David Grossman, in *On Combat*, speaks of the need to prevent or to mitigate against the negative effects of stress upon police officers and members of the military during crisis events, and discusses comprehensively the many aspects (including behavioral, physiological, and biochemical) involved in stress response, as well as ways to prepare for and to mitigate against stressful events.¹¹⁰ Dr. Anne Fabiny, Assistant Professor of Medicine at Harvard Medical School adds,

You can't see or touch stress, but you can feel its effects on your mind and body. In the short term, stress quickens your heart rate and breathing and increases your blood pressure. When you're constantly under stress, your adrenal glands overproduce the hormone cortisol. Overexposure to this hormone can affect the function of your brain, immune system, and other organs.¹¹¹

In their 2004 article for Police Chief magazine, "Why Things Go Wrong in Police Work,"¹¹² Lawrence Blum and Joseph Polisar provide unique and valuable insight into the issue of the negative impacts of stress upon police officer crisis decision making. These authors refer to what they have termed, "stress-exposure"¹¹³ events, situations involving "unanticipated, rapidly changing, or chaotic high-stress conditions [that] spark

¹⁰⁹ Ibid., 272.

¹¹⁰ Grossman, *On Combat: The Psychology and Physiology of Deadly Conflict in War and Peace*.

¹¹¹ Anne Fabiny, "What Meditation Can Do for Your Mind, Mood, and Health," *Harvard Health Publications*, August 2014, <https://hms.harvard.edu/sites/default/files/assets/Harvard%20Now%20and%20Zen%20Reading%20Materials.pdf>.

¹¹² Lawrence N. Blum and Joseph M. Polisar, "Why Things Go Wrong in Police Work," *The Police Chief* 71, no. 7 (July 2004): http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=336&issue_id=72004.

¹¹³ Ibid.

and...fuel..."¹¹⁴ the brain, causing a shift from an analytic mode of thinking to a reactive one, which they claim produces the aforementioned "fight, flight, or freeze" response. Blum and Polisar argue that during these unanticipated situations, officers will tend to experience a "momentary mental shock reaction...called perceptual lag,"¹¹⁵ and consequently, some officers may tend to respond with a reactive and inappropriate sense of urgency, which may cause them to act inappropriately, and often, with excessive force. Alternatively they say, under the same stressful conditions, other officers may:

For a split-second in time—remain immobile in the face of an imminent threat. [They go on], When a police officer experiences a threat he or she did not expect to encounter, the brain is likely, without specific training, conditioning, and practice, to attempt to countermand it, to react with *neurochemical, survival-oriented instinct reactions* (emphasis added) to the perceived threat, as opposed to strategic, purposeful reactions that are based upon the conditions the officer is facing.¹¹⁶

The article culminates with a spirited and convincing call for "training and practice [in] mental, emotional, and physical fitness"¹¹⁷ that would better enable police officers to make effective decisions and to perform at peak levels during these "stress-exposures."

Despite this apparent widespread sentiment among scholars, as well as practitioners, that stress often has significant negative effect upon crisis decision making, scant evidence appears to be available in the literature detailing specific instances of stress *causing* first responders to mishandle a crisis. Nonetheless, it seems self-evident that many of the aforementioned negative effects of stress would *correlate* with a significant adverse influence on first-responder crisis decision making. Later in the thesis, the potential value of MT is examined to serve as a prophylactic designed to prevent the deleterious effects of stress from negatively impacting crisis decision making.

¹¹⁴ Ibid.

¹¹⁵ Ibid.

¹¹⁶ Blum and Polisar, "Why Things Go Wrong in Police Work."

¹¹⁷ Ibid.

H. WHERE DOES THE NATIONAL INCIDENT MANAGEMENT SYSTEM FIT IN?

The National Incident Management System (NIMS), established in 2003 through *Homeland Security Presidential Directive* (HSPD-5) is applicable to first responders in the United States at all levels of government (federal, state, tribal, and local). NIMS supplies a *template* (emphasis added) for the management of incidents of all types and sizes.¹¹⁸ A fundamental element of NIMS is the incident command system (ICS). ICS is a “flexible, standardized incident management structure... designed to enable effective and efficient incident management and coordination.”¹¹⁹ ICS has become a standard framework used by first responders at the variety of crises to which they respond. Tellingly, Renaud proposes that there is a “missing piece” of NIMS. She asserts, “The NIMS must expand to include a full, complete discussion of this first phase of chaos. It must teach ways to *think through the problem at hand* (emphasis added) and apply process with purpose. It must find a way to teach these skills to incident commanders. This is the crucial, missing piece of NIMS.”¹²⁰ Although Renaud is referring specifically to a scenario that she has coined “edge of chaos,” and this thesis is examining all (or at least a variety of) scenarios in which first responders must make crisis decisions, Renaud’s contention that NIMS is not a complete or holistic crisis decision making framework is important to consider.

Renaud’s point, that the NIMS is missing a critical piece, is salient. Consider the definition of NIMS as supplied by the DHS and the Federal Emergency Management Agency (FEMA), “NIMS is a comprehensive, national approach to incident management that is applicable to all jurisdictional levels and across jurisdictional functions. It is intended to be applicable across a full spectrum of potential incidents, hazards, and impacts, regardless of size, location, or complexity.”¹²¹ Thus, the DHS and FEMA are

¹¹⁸ Federal Emergency Management Agency, *NIMS: Frequently Asked Questions* (Washington, DC: Department of Homeland Security, n.d.), 3, <https://www.fema.gov/pdf/emergency/nims/nimsfaqs.pdf>.

¹¹⁹ Ibid.

¹²⁰ Renaud, “The Missing Piece of NIMS: Teaching Incident Commanders How to Function in the Edge of Chaos.”

¹²¹ Federal Emergency Management Agency, *NIMS: Frequently Asked Questions*.

effectively telling first responders that they have created, and directed the use of, a system designed “to manage” *all* types and sizes of incidents, in *every* location and jurisdiction across the homeland, and suitable for use by *all* types of responders. Or are they? Was it really the intent of the designers of NIMS to provide an incident management system that is fully applicable for use in the phase of a crisis that Renaud has so compellingly termed “the edge of chaos?” Elsewhere, the DHS refers to NIMS/ICS as a “*template*,” [which] “simply provides the framework to enhance the ability of responders, including the private sector and NGOs, to work together more effectively.”¹²² It seems apparent that this template, or framework, should not be misconstrued as a decision making tool, but rather should be understood to be used as a management tool designed to assist with concerns, such as common terminology, basic command and control concepts, and tracking of personnel and resources. Regardless of the intent of the designers of NIMS, perhaps it is not the purview of NIMS itself, but of corollary or even requisite training and experience, to improve upon the performance of first responders and other stakeholders in these initial chaotic moments of a crisis. Renaud has very creatively captured attention by declaring the existence of a “missing piece of NIMS.” Conceivably though, no “system” can possibly be designed that will adequately address the extreme levels of disorder inherent in Renaud’s edge of chaos, or in any crisis. In fact, elsewhere Renaud, describing the initial chaotic/complex moments of a crisis response, observes, “In a complex environment, incident commanders can begin to see parts of the situation they recognize and can work with. As this complexity gives way to complicated situations, the NIMS and ICS structure can be employed generally with a high rate of success.”¹²³ What is seen is an apparent acknowledgement by Renaud that nothing specific and concrete can likely be added to NIMS/ICS to fill this “missing piece.” Rather, what is called for is recognition within the NIMS of the fact that NIMS/ICS does not and cannot specifically address first-responder crisis decision making, and consequently, first responders must seek to employ consciously, in a holistic manner, decision making knowledge, skills, and abilities derived from a variety of

¹²² Ibid., 4.

¹²³ Renaud, “Making Sense in the Edge of Chaos,” xiv.

sources. It is argued in the following pages that *mindfulness* merits consideration as one of these sources.

I. CONCLUSION

A review of the literature relevant to first-responder crisis decision making reveals certain consistent themes and areas of concurrence, as well as distinct gaps. The literature shows widespread agreement that the types of crises that first responders respond to and operate at are characterized by confusion, time pressure, emotional and psychological stress, and inadequate information on which to base a decision. Yet, the experts also agree that in most crises, first responders must endeavor to render their decisions rapidly, despite the uncertainty and limited availability of information, lest the situation grow far worse.

Evidence and information that pertains to the predominant first responder decision making paradigms, frameworks, models, and systems was found not only in literature specific to first responders but within literature that has examined the types of crisis decisions made within the military and business environments as well. Certain aspects of these environments have clear parallels to the varied settings in which first responders must effect their crisis decisions. A consistent theme discovered in the literature is that of the imperative to apply the appropriate decision making method to the context of the particular situation at hand. Concurrence is widespread that first responders employ two very different types of decision making, depending on circumstances, *analytical* and *intuitive*. The prevailing view is that the NDM framework, and in particular Klein's RPD model of rapid decision making, is particularly relevant to first-responder crisis decision making. However, some disagreement was discovered in the literature in regard to the degree of risk of errors resultant from the use of this type of decision making, which is reliant on pattern recognition. In the case of those sources that pointed out the vulnerability of RPD to error, a consensus appeared that the source of this vulnerability is cognitive bias. Although many authorities believe that cognitive bias enables more rapid and effective decision making in certain scenarios, particularly during crises, ample

evidence is also available to demonstrate that unconscious cognitive biases have very significant negative impacts upon first-responder crisis decision making.

The importance of good SA in the decision making process, as well as the description of *perception*, *comprehension*, and *prediction* as three vital elements of SA, are common themes found in SA literature. The concept of sensemaking as something somewhat similar to SA, yet much more complex and nuanced, is very prevalent. Nevertheless, much (but certainly not all) of the literature specific to first responder decision making does not describe sensemaking nor argue for its importance in the decision making process. Although the more recent literature tends to be far more likely to reference sensemaking, and to point out its importance, the literature review reveals that at this point in time, first responders are far more likely to be familiar with the concept of SA than they are the notion of sensemaking. This knowledge gap is likely to narrow as time goes along, and more first responders become familiar with the value of sensemaking.

This thesis research attempted to uncover either causation or correlation between *stress* and the negative impact upon first-responder crisis decision making. What was actually discovered is a surprising gap in the literature relevant to the relationship between stress and decision making, which is in stark contrast to the abundance of literature found that details the effects of stress upon first responders' physical and emotional health. One consistent theme that was discovered, though, is that of stress as a producer of generally a diverse range of negative physiological and behavioral reactions. Although not specifically delineated anywhere in the literature reviewed in this thesis, these reactions appear to correlate to negative impact upon first-responder crisis decision making. This potential for correlation is analyzed later in the thesis.

In light of the fact that both SA and sensemaking were demonstrated to have such a strong correlation with effective crisis decision making, the literature was reviewed specifically to search for a consensus on the particular human factors, skills, and abilities essential to enhancing SA and sensemaking. Broad agreement was found in regard to the importance of self-awareness, working memory capacity, attentional control, avoidance of narrowing of focus (tunnel vision), stress management and adaptation, capacity to

observe and perceive, comprehension ability, facility to think adaptively and creatively, predictive ability, and non-reactivity. Many of these human qualities are related to or are dependent on one another.

THIS PAGE INTENTIONALLY LEFT BLANK

III. SYSTEMATIC REVIEW AND META-ANALYSIS OF THE MINDFULNESS TRAINING LITERATURE

*The faculty of voluntarily bringing back a wandering attention over and over again is the very root of judgment, character, and will.... An education which should improve this faculty would be the education **par excellence**.*

—William James, 1890, Founder of American Psychology

A. INTRODUCTION

Various competing definitions of *mindfulness* exist, which admittedly poses a degree of difficulty in researching the idea of whether the incorporation of MT as one piece of a framework designed to enhance first-responder crisis decision making has merit. In 1979, at the University of Massachusetts Medical School, Jon-Kabat Zinn created the mindfulness-based stress reduction (MBSR) program.¹²⁴ Zinn, generally credited as the Father of the mainstream mindfulness movement, defines *mindfulness* as “the awareness that arises through paying attention on purpose in the present moment-non-judgmentally.”¹²⁵ The aforementioned authority on sensemaking, Dr. Karl Weick, has defined mindfulness as:

The combination of ongoing scrutiny of existing expectations, continuous refinement and differentiation of expectations based on newer experiences, willingness and capability to invent new expectations that make sense of unprecedented events, a more nuanced appreciation of context and ways to deal with it, and identification of new dimensions of context that improve foresight and current functioning.¹²⁶

¹²⁴ Kabat-Zin, *Wherever You Go, There You Are Mindful Meditation in Everyday Life*.

¹²⁵ Maia Szalavitz, “Q&A: Jon Kabat-zinn Talks about Bringing Mindfulness Meditation to Medicine,” *Time Magazine*, January 2012, <http://www.healthland.time.com/2012/01/11/mind-reading-jon-kabat-zinn-talks-about0bringing-mindfulness-meditation-to-medicine>.

¹²⁶ Weick and Sutcliffe, *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*, 32.

Others have described mindfulness as “maintaining a moment-by-moment awareness of our thoughts, feelings, bodily sensations, and surrounding environment.”¹²⁷ The opposite of mindfulness is “an autopilot state where habits, routines, and understandings from the past are driving our interaction with present moment experience.”¹²⁸ Deuster and Schumaker assert (and this thesis concurs) that the most pertinent characteristics of mindfulness are “awareness and attention.”¹²⁹ This assertion is important, as a primary component of this thesis’ argument for MT as worthwhile toward the enhancement of crisis decision making is the positive effect upon *awareness* and *attention* resulting from MT that has been demonstrated. Evidence for this claim is offered later in the thesis. Table 1 presents several definitions of mindfulness.

¹²⁷ “Greater Good: The Science of a Meaningful Life,” January 7, 2016, <http://www.greatergood.berkeley.edu/topic/mindfulness/definition>.

¹²⁸ Amanda Ie, Christelle T. Ngoumen, and Ellen J. Langer, ed., *The Wiley Blackwell Handbook of Mindfulness*, 1st ed. (Hoboken, NJ: John Wiley & Sons, 2014), 972.

¹²⁹ Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 93.

Table 1 *Various Definitions of Mindfulness*

Study	Definition
Bishop et al. ²⁹	A process of regulating attention to bring a quality of nonelaborative awareness (often termed “nonjudgmental”) to current experience and a quality of relating to one’s experience within an orientation of curiosity, experiential openness, and acceptance.
Shapiro et al. ³⁰	The three axioms of mindfulness—intention, attention, and attitude—are not separate stages. They are interwoven aspects of a single cyclic process and occur simultaneously. Mindfulness is this moment-to-moment process.
Szalavitz ³¹	The awareness that arises through paying attention on purpose in the present moment, nonjudgmentally.
Brown and Ryan ³²	A receptive attention to and awareness of present events and experiences.
Jha et al. ³³	Mental mode characterized by full attention to present-moment experience without judgment, elaboration, or emotional reactivity.

Table 1. Several Definitions of Mindfulness.¹³⁰

The roots of mindfulness can be traced to Eastern spiritual practices, and particularly, Buddhist meditation.¹³¹ However, in the mainstream mindfulness movement, and as used in the context of this paper, mindfulness refers to a secular

¹³⁰ Source: Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 94. The sources of the five definitions in Table 1 are from the following references in order of appearance: Scott R. Bishop et al., “Mindfulness: A Proposed Operational Definition,” *Clin Psychol Sci Prac.* 11 (2004): 230–241; Shauna L. Shapiro et al., “Mechanisms of Mindfulness,” *J Clin Psychol.* 62, no. 3 (2006): 373–386; Szalavitz, “Q&A: Jon Kabat-zinn Talks about Bringing Mindfulness Meditation to Medicine”; Kirk Warren Brown and Richard M. Ryan, “The Benefits of Being Present: Mindfulness and its Role in Psychological Well-being,” *J Pers Soc Psychol.* 84, no. 4 (2003): 822–848; Amishi P. Jha et al., “Examining the Protective Effects of Mindfulness Training on Working Memory Capacity and Affective Experience,” *Emotion* 10, no. 1 (2010): 54–64.

¹³¹ West, *The Psychology of Meditation*.

methodology not directly connected to any religious or spiritual practice.¹³² Notwithstanding the spiritual, philosophical, or religious roots of mindfulness practice, recent advances in neuroimaging have provided evidence “demonstrat[ing] that mindfulness is clearly related to activities of the brain and nervous system, not to an ethereal process or belief system.”¹³³

B. MINDFULNESS PRACTICE

The *state* of mindfulness purportedly results from mindfulness *practice*. It is important to note the differences and similarities between the words *practice* and *training* in the context of mindfulness. Generally, the word *training* denotes an activity that involves an instructor who guides trainees through the process of training. *Practice* is something that can be done without the aid of a coach or instructor. Oftentimes, regular practitioners of mindfulness, meditation, yoga, etc., refer to the time they spend pursuing these activities as their “practice.”

No one standard method is used to teach or to practice mindfulness. However, commonalities exist among the various mindfulness systems and schools of thought. A common element of most mindfulness programs is a regular practice of meditation. How this meditation is practiced (sitting, standing, lying, walking, or a combination), frequency, and the length of each session, varies. Nonetheless, it is important to note that while MT and meditation may overlap, they are each a distinct methodology, and while most MT programs may in fact rely on meditation as one core aspect, some MT programs focus only lightly upon meditation, or do not use it at all.¹³⁴ Some mindfulness programs incorporate meditation with more physical practices, such as yoga, tai chi, Quigong, aikido, relaxation exercises, breathing techniques, tapping, and meditation.¹³⁵ Most mindfulness programs employ a variety of focus and visualization exercises. Other

¹³² Ibid.

¹³³ Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 93.

¹³⁴ West, *The Psychology of Meditation*.

¹³⁵ “Care Services Mind Body Program,” accessed July 5, 2015, <https://uhs.berkeley.edu/facstaff/care/mindfulness/>.

mindfulness programs have incorporated computer-based biofeedback games, brain wave training, brain synchrony training, somatic coaching, and other techniques.¹³⁶ Dr. Amishi Jha, a neuroscientist who is a leading expert in the growing field of contemplative neuroscience, explains that sitting meditation is a “foundational practice exercise offered in Mindfulness Training programs.”¹³⁷ As Jha describes MT, trainees are directed to sit comfortably “and to direct their full attention to the sensations of breathing. Whenever their attention wanders, they are instructed to return it to the breath.”¹³⁸ This emphasis on attentional training through a disciplined focus on the breath is a common aspect of most MT programs. Jha elaborates that in addition to a focus on attention exercises, “MT emphasizes the importance of repeatedly and intentionally bringing an affective quality of acceptance to present moment experience.”¹³⁹ In an article that analyzed the events leading to the line of duty death of a Forest Service firefighter that occurred while he was participating in a training rappel from a helicopter, Jim Saveland and Ivan Pupilidy discuss “potential future improvements,”¹⁴⁰ among them the implementation of MT. They describe a mindfulness practice as being essentially a process involving four steps:

1. Directing and sustaining attention on a selected object.
2. Detecting mind wandering and distractions.
3. Disengaging attention from distractors and shifting attention back to the selected object.
4. Cognitive reappraisal of distracter that is non-judgmental (e.g., “just a thought,” “it’s OK to be distracted”).¹⁴¹

¹³⁶ Richard Strozzi-Heckler, *In Search of the Warrior Spirit* (Berkeley, CA: North Atlantic Books, 1992).

¹³⁷ Amishi P. Jha, Scott L. Rogers, and Alexandra B. Morrison, “Mindfulness Training in High Stress Professions: Strengthening Attention and Resilience,” in *Mindfulness-Based Treatment Approaches: Clinician’s Guide to Evidence Base and Applications*, ed. Ruth A. Baer, vol. 347, 2nd ed. (London: Academic Press, 2014), 352.

¹³⁸ *Ibid.*

¹³⁹ *Ibid.*

¹⁴⁰ Jim Saveland and Ivan Pupilidy, “Rappel Accident Human Performance Analysis,” U.S. Forest Service, Willow Helibase Rappel Accident, July 2009, 1, <http://bit.ly/1oBuQzp>.

¹⁴¹ *Ibid.*, 19.

Saveland and Pupulidy explain that the object of focus is often the breath, or sounds, but can take many forms. In addition to the classical sitting meditation, mindfulness practices may involve movement, such as mindful yoga or tai chi, or even mindful eating. Slow walking and running may also be primary components of a MT program. Saveland and Pupulidy also offer an excellent description of another traditional mindfulness practice, the body scan. They describe it as “a systematic scan of sensations in the body... done while sitting, lying still, or while moving,”¹⁴² and point out that sports psychologists refer to a particular type of body scan that they call “associative attentional strategy.”¹⁴³ This type of body scan involves “monitoring bodily functions and feelings, such as heart rate, muscle tension, level of perceived exertion, and breathing rate.”¹⁴⁴

Another recent peer-reviewed article proposes mindfulness as beneficial toward improving the performance of special operations soldiers. The article’s title, “Mindfulness: A Fundamental Skill Set for Performance Sustainment and Enhancement” illustrates quite clearly the conclusions of its authors. This emphasis on attentional training through a disciplined focus on the breath is a common aspect of most MT programs. Jha elaborates that in addition to a focus on attention exercises, “MT emphasizes the importance of repeatedly and intentionally bringing an affective quality of acceptance to present moment experience,”¹⁴⁵ Deuster and Schoomaker equate mindfulness with SA. In discussing the applicability of mindfulness skills to improve the performance of special operations medics during combat, these authors offer the view, based upon their examination of the available evidence, “agile and adaptive reasoning, which is required for mission planning and execution, surely can benefit from improvements in attentiveness and the working memory of factors influencing selection of the best course of action among a multitude of choices.”¹⁴⁶ This emphasis on a

¹⁴² Saveland and Pupulidy, “Rappel Accident Human Performance Analysis,” 20.

¹⁴³ Ibid.

¹⁴⁴ Ibid.

¹⁴⁵ Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 95.

¹⁴⁶ Ibid., 96.

practice of various techniques designed to focus attention on the present moment, in a self-aware, non-judgmental, non-reactive, and detached manner, is the very core of MT.

C. MINDFULNESS TRAINING PROGRAMS

Formal MT programs have existed since at least 1979 in the United States,¹⁴⁷ and the foundational component of most MT programs, meditation, has been practiced for 3,000 years.¹⁴⁸ However, only very recently in the United States has the concept of MT has gained prominence in the American consciousness. This growing awareness and popularity of MT is likely a consequence of media attention that has been driven by a host of recent studies, rooted in neuroscience, that have produced findings demonstrating the efficacy of MT toward the reduction of chronic pain, physical disease, emotional problems, PTSD, addictions, and phobias, as well as the enhancement of overall physical, mental, and emotional health and well-being. The evidence that has perhaps been most convincing to those previously skeptical or ambivalent has been found in a number of recent neuroscience studies that have demonstrated profound, observable changes to the brain, such as a 2011 Harvard study (among many others producing similar results that are discussed later in the thesis) examining the effects of an eight-week MT program. This study concluded from brain scans that “significant increases in grey matter density”¹⁴⁹ had been observed in the brains of participants. The affected areas of the brain included “areas related to perception, body awareness, pain tolerance, emotion regulation, introspection, complex thinking, and sense of self.”¹⁵⁰

Deuster and Schoomaker are among a host of authorities who contend that “Mindfulness and the awareness that underlies it are inherent capabilities that can be

¹⁴⁷ “History of MBSR,” accessed August 20, 2016, <http://www.umassmed.edu/cfm/stress-reduction/history-of-mbsr/>.

¹⁴⁸ Roger Walsh, “Meditation Practice and Research,” *Journal of Humanistic Psychology* 23, no. 1 (Winter 1983): 18–50, doi:10.1177/0022167883231004.

¹⁴⁹ Christina Congleton, Britta K. Hölzel, and Sara W. Lazar, “Mindfulness Can Literally Change Your Brain,” *Harvard Business Review*, January 8, 2015, <https://hbr.org/2015/01/mindfulness-can-literally-change-your-brain>.

¹⁵⁰ Ibid.

honed through training.”¹⁵¹ Several of the many systems that employ the practice of mindfulness, or MT are the following.

- **Mindfulness-based Stress Reduction (MBSR):** A combination of meditation and yoga. An eight-week intensive course that meets weekly. It is the most common and well-validated mindfulness-training program. MBSR was developed in 1979 by Jon Kabat-Zinn, at the University of Massachusetts Medical Center. It is now available in over 200 medical centers, hospitals, and clinics worldwide.¹⁵² Most other MT programs are modeled upon or adapted from MBSR.
- **Mindfulness-based Resilience Training (MBRT):** An eight-week experiential learning course designed for first responders. This program is similar to MBSR. Participants learn “skills enhancing mental clarity, personal health, mindful exercise emphasizing range of motion and injury prevention. Practical skills to assist mitigation of stressors in the field, office and at home” are presented. Meets two hours per week, one day per week for eight weeks, with a four-hour retreat.¹⁵³
- **Mindfulness-based Attention Training (MBAT) Firefighter Project:** A University of Miami based study developed by leading mindfulness training researcher Dr. Amishi Jha and colleagues. This program began in the summer of 2015 and is described as “an innovative mindfulness and relaxation training program [for] Miami-Dade Firefighters. [This program is] one phase of a larger research project funded by the Department of Defense, which aims to determine if mindfulness and relaxation training might help to protect individuals in high-stress, high-demand careers.”¹⁵⁴ MBAT is based upon MBSR and other recognized MT techniques, integrated with specific subject matter germane to firefighters.¹⁵⁵ Meets two hours per week for four weeks with “homework” in the form of 10–15 minutes of self-guided meditation.¹⁵⁶

¹⁵¹ Deuster and Schoomaker, “Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement,” 93–9.

¹⁵² “What Is MBSR?” accessed July 9, 2015, <http://www.mindfullivingprograms.com/whatMBSR.php>.

¹⁵³ “MBRT 8-week Program for First Responders,” accessed July 2, 2015, www.yogahillsboro.com/event/mbrt-8-week-program-summer/.

¹⁵⁴ “Mindfulness-Based Attention Training: Firefighter,” accessed July 9, 2016, <http://www.amishi.com/lab/>.

¹⁵⁵ Ibid.

¹⁵⁶ Lindsay Holmes, “A Simple Practice Can Transform the Lives of First Responders,” *Huffington Post*, last modified August 21, 2015, http://www.huffingtonpost.com/entry/how-this-simple-practice-may-transform-the-lives-of-first-responders_us_55cb754be4b0f1cbf1e6ff66.

- **Strength Training for Attention and Resilience in ROTC Cadets (STARR):** This training is a two-part experimental program. The first aspect is a train-the-trainer program, and the follow-on portion is designed such that the Reserve Officers Training Corps (ROTC) personnel who have been trained will then deliver “shorter, low dose mindfulness based military training [to] ROTC cadets.”¹⁵⁷ Effectiveness of this program will be assessed through measures of attention and working memory.¹⁵⁸
- **Mindfulness-based Cognitive Therapy (MBCT):** An eight-week, one session per week course designed primarily to treat depression.¹⁵⁹
- **Mindfulness-based Mind Fitness Training (MMFT):** This training is a proprietary training curriculum owned by a now defunct, and therefore, is no longer in use. MMFT was used within the military, but appeared to be applicable for all high-stress organizations. It was an eight-week course adapted from MBSR, approximately 2.5 hours per week with approximately 20 students per class. This course was also taught as a seven- day intensive.¹⁶⁰

It is also interesting to mention that many companies, organizations, and workplaces appear to have developed or to be in the development stages of their own customized MT programs. For example, Google has created such a program, the search inside yourself program (SIY). SIY was developed as an in-house program for Google employees, and more recently, has been expanded as an offering to individuals and organizations outside of Google. Google describes SIY as blending:

the tools of neuroscience, mindfulness, and emotional intelligence, SIY provides evidence-based practices for leaders to grow. SIY is a 4-week program beginning with an interactive 2-day training followed by recommended peer-to-peer practices to sustain and integrate learning, all with a design that emphasizes self-directed growth from the inside-out.¹⁶¹

The aforementioned list is not all-inclusive, nor is it the intent of this thesis to delve into the various differences and nuances among and between each of these

¹⁵⁷ “Research,” May 30, 2016, <http://www.psy.miami.edu/graduate/health-division/research/>.

¹⁵⁸ Ibid.

¹⁵⁹ Walter E. B. Sipe and Stuart J. Eisendrath, “Mindfulness-based Cognitive Therapy: Theory and Practice,” *Can J Psychiatry* 57, no. 2 (February 2012): 63–9, doi:22340145.

¹⁶⁰ “Mindfulness-based Mind Fitness Training,” accessed July 9, 2015, www.mind-fitness-training.org/training.html.

¹⁶¹ “Search Inside Yourself,” accessed August 8, 2016, <https://siyli.org/whysiy/>.

trainings, or to advocate for one or more particular systems as more appropriate than others in the pursuit of the goal of improving first-responder crisis decision making. The choice between any of these systems, or to design a customized system, should be the purview of individual organizations, and perhaps, a subject for further research.

D. BEHAVIORAL CHANGES

Substantial evidence demonstrates the production of a variety of positive individual behavioral changes resultant from MT. Although it does not appear that any studies have yet been conducted with the specific goal of assessing whether any direct correlation or causation exists between MT and first-responder crisis decision making, many of these behavioral changes would arguably correlate well with this goal.

Studies that have been conducted with the aim of assessing the effect of MT on improving the performance of military members and high-level athletes, both of whom share with first responders the common need in dynamic, stressful, and time constrained environments, to make rapid and effective decisions of high consequence, demonstrated great promise. Additionally, since at least 1979, MT has been recognized as effective in the treatment of chronic pain, physical disease, emotional problems, PTSD, addictions, and phobias.¹⁶²

Research data collected from the various workplace-based MBSR programs at the University of Massachusetts demonstrate significant positive improvements to a variety of behavioral traits for a broad cross section of occupations. Results are as follows:

- 29% decrease in perceived stress symptoms
- 26.5% increase in acting with self-awareness
- 13% increase in self-efficacy
- 26% increase in observational skills
- 25% increase in non-reactivity

¹⁶² Kabat-Zin, *Wherever You Go, There You Are Mindful Meditation in Everyday Life*.

- 22% increase in non-judgment¹⁶³

For some time now, many in the first responder community have acknowledged the benefits of MT in the treatment of PTSD. As one example, the 2014 conference of the International Association of Chiefs of Police offered a session for its attendees entitled “Using Mindfulness and Qigong and Tai Chi Practices to Help Officers Manage Stress. Evidence-Based Treatment for Stress and Post-Traumatic Stress Disorder.”¹⁶⁴ Various studies have provided evidence for the applicability of MT in the prevention of PTSD, as well as in treatment of PTSD symptoms for those in high-stress occupations, such as first responders.¹⁶⁵

Despite this abundance of promising research, review of the literature reveals very few cases in which first responder organizations have attempted to apply MT specifically to enhance crisis decision making. However, that situation may be changing. In addition to the aforementioned University of Miami based MBAT Firefighter Project, involving the Miami-Dade fire department, two first responder communities that have recently been studying the potential benefit of MT on decision making and performance are several Hillsboro, Oregon area police departments, and a small group of U.S. Forest Service firefighters.

In the Hillsboro, Oregon region, several police departments have joined forces to participate in a novel MT program and associated university study. The intended purpose of this program is to assist these police officers with “the traumatic stressors of their work and to support resiliency, healthy community relations and mind fitness that *enhances their ability to respond, versus react, during crisis situations* [emphasis added].”¹⁶⁶

¹⁶³ “Workplace MBSR Programs,” accessed July 6, 2015, www.umass.edu/cfm/Stress-reduction/workplace-Programs/.

¹⁶⁴ Donald Richard and Susan Balaban, “Using Mindfulness and Qigong and Tai Chi Practices to Help Officers Manage Stress: Evidence Based Treatment for Stress and Post-traumatic Stress Disorder,” education session at International Association of Chiefs of Police Conference, Orlando, FL, October 1, 2014).

¹⁶⁵ “How Mindfulness Training Could Help People with PTSD Symptoms,” May 2013, www.huffingtonpost.com/2013/05/29/mindfulness-ptsd-symptoms-cortisol_n_3348593.html.

¹⁶⁶ Richard Goerling, “Warrior Resilience: Teaching Mindful Integration in Law Enforcement Culture and Training,” in *The Authentic Leadership Series*, interview by James Thompson (Charles Town, WV: American Public University, 2013).

Lieutenant Richard Goerling, of the Hillsboro Police Department, and who served for 27 years with the U.S. Coast Guard, both active and reserve, retiring at the rank of Commander, is a leading proponent in both the law enforcement and military communities for the use of MT to improve resiliency and performance. Goerling, also a certified MT facilitator and an affiliate faculty member at Pacific University Graduate School of Professional Psychology, has referred to MT as “situational awareness graduate school.”¹⁶⁷ He goes on to say, “Through greater self-awareness, police officers [and this thesis argues all first responders] can learn greater situational awareness and develop the ability to be present, focused, and grounded in the naturally occurring fog where heroes meet crises.”¹⁶⁸ A collaborative research and training project partnership between the Hillsboro, Oregon Stress Reduction Clinic and Pacific University, begun in 2013, studying the effectiveness of MBRT, and involving three groups of police officers from different departments, recently published results that demonstrate “significant statistical changes in pre- and post-program mental, physical, and social health status levels for participants.”¹⁶⁹ Apart from the results of the study, Goerling relates that officers “are self-reporting improvements in sleep, pain management, emotional regulation, and emotional intelligence.”¹⁷⁰

A group of U.S. Forest Service firefighters has also participated in a mindfulness-based SA study. James Saveland and Ted Putnam, both retired Forest Service employees, with backgrounds in psychology, human factors, and mindfulness, took an interest in the potential benefits that may accrue from MT in regard to wildland firefighters’ ability to maintain SA and to make crisis decisions. Saveland and Putnam designed a half-day course that provided firefighters with the results of recent research on the benefits of mindfulness in enhancing SA. This course “taught mindful breathing, walking, and body-

¹⁶⁷ Richard Goerling, “The Role of Mindfulness Training to Policing A Democratic Society,” Officer Safety Corner, *Police Chief Magazine* 81 (April 2014): 11.

¹⁶⁸ “Mindful,” accessed June 7, 2014, <http://www.mindful.org/news/mindfulness-in-the-police-chief-magazine>.

¹⁶⁹ Michael S. Christopher et al., “A Pilot Study Evaluating the Effectiveness of a Mindfulness-based Intervention on Cortisol Awakening Response and Health Outcomes among Law Enforcement Officers,” *Journal of Police and Criminal Psychology* 31, no. 1 (January 23, 2015): 15–28.

¹⁷⁰ Goerling, “The Role of Mindfulness Training to Policing A Democratic Society,” 10–11.

scanning, and suggested how mindfulness could be applied to any kind of physical activity.”¹⁷¹ In a 2004 interview, retired firefighter Putnam, who holds a PhD in experimental psychology, speaks of the “widely accepted wisdom that 80% of accident and fatality causes are due to mental errors.” His remarks:

I feel the single best way to improve firefighting awareness, thinking and decision making is for firefighters to learn mindfulness meditation. I recommend mindfulness precisely because it focuses on learning to observe your mind under dynamic situations. Meditation means both mind training and mind protection. Mind protection means you can think more clearly under adverse conditions.¹⁷²

Additional evidence for the potential for MT to produce or enhance positive behavioral traits that may correlate with improved first-responder crisis decision making is found in a 2011 Bruce Smith et al. study of mindfulness and urban firefighters. The study results proposed, “during a stressful or traumatic event, mindfulness may allow an individual to maintain a sharper focus on the emergency at hand and reduce the likelihood of peritraumatic dissociation.”¹⁷³ Peritraumatic dissociation is a temporary condition, brought on by a traumatic event, in which an individual’s typical awareness, memory, or even identity is disrupted.¹⁷⁴

MT has been studied as potentially beneficial in improving the performance of military members and professional athletes, who share in common with first responders the need in time constrained, dynamic, and stressful environments, to process swiftly what limited information is available to them, and then to make rapid decisions, lead, and take actions, with much riding on the outcome. The U.S. Army, U.S. Marine Corps, Seattle Seahawks, and New York Knicks are a few examples of organizations that have incorporated MT in their organizations in the pursuit of enhanced performance. For

¹⁷¹ Boyce, “Inhale, Exhale, Fight Fire.”

¹⁷² Bill Muller, “Leaders We Would Like to Meet—Ted Putnam,” *Wildland Fire Leadership*, January 2004, www.fireleadership.gov/toolboxes/leaders_meet/interviews/leaders_TedPutnam.html.

¹⁷³ Bruce W. Smith et al., “Mindfulness Is Associated with Fewer PTSD Symptoms, Depressive Symptoms, Physical Symptoms, and Alcohol Problems in Urban Firefighters,” *Journal of Consulting and Clinical Psychology* 79 no. 5 (October 2011): 616, doi:10.1037/a0025189.

¹⁷⁴ Priscilla Schutz, “Objective Assessment of Peritraumatic Dissociation: Psychophysiological Indicators,” *American Journal of Psychiatry* 154, no. 8 (1997): 1080–1088.

instance, in 2012, the National Football League's Seattle Seahawks hired mindfulness coach and psychologist, Michael Gervais. Interestingly, the Seahawks then appeared in consecutive Superbowls in 2013 and 2014. "At the center of high performance is presence, awareness, and trust," said Gervais, "Awareness allows us to guide our minds, relentlessly toward an ideal mindset."¹⁷⁵ Phil Jackson, currently President of the New York Knicks, who has won more National Basketball Association (NBA) championships (11) than any other coach, is a well-known mindfulness proponent. Jackson credits mindfulness practice as an integral component of his success.¹⁷⁶ He has employed a mindfulness instructor on several teams he has coached, and many of his current and former players, such as Michael Jordan, Kobe Bryant, and Shaquille O'Neal, have utilized MT, which they credit for improvements in their performance.¹⁷⁷ Parallels can be drawn between first responders and such high-level professional athletes in regard to the benefits of beneficial behavioral and character traits, such as presence, awareness, and trust, particularly on "game day" for pro athletes, and during crisis events, "game day" for first responders.

As far back as at least 30 years ago, well before the term mindfulness was in vogue, the U.S. military special operations community explored the potential for what they referred to at the time as "contemplative practice" as a means of enhancing the performance of their soldiers. Richard-Strozzi Heckler, in his book, *In Search of the Warrior Spirit*, writes extensively about his experience as a lead instructor for *The Trojan Warrior Project*, the Army code name for a six-month pilot-project that took place during 1985. This project was designed to train a group of 25 Green Berets in what was referred to as "new human technologies,"¹⁷⁸ meditation, biofeedback, aikido, and mind-body psychology. In the 245 page after-action report, it was documented that "on average the

¹⁷⁵ Soren Gordhamer, "Mindfulness: The Seattle Seahawk's Sports Psychologist Shares Why It Matters," *Huffington Post*, April 2014.

¹⁷⁶ Roland Lazenby, "The Zen Master's Zen Master: How Phil Jackson's Mindfulness Guru Is Helping the New York Knicks," July 14, 2015, https://sports.vice.com/en_us/article/the-zen-masters-zen-master-how-phil-jacksons-mindfulness-guru-is-helping-the-new-york-knicks.

¹⁷⁷ "The Mindful Athlete," July 19, 2016, <http://mindfulathlete.org/>.

¹⁷⁸ Richard Strozzi-Heckler, *In Search of the Warrior Spirit, Fourth Edition: Teaching Awareness Disciplines to the Green Berets* (Berkeley, CA: Blue Snake Books, 2007), xvi.

soldier's abilities across program goals increased by 75% from the points where they started.”¹⁷⁹ Many of the goals of this program would arguably correlate closely with the goal of enhancing first-responder crisis decision making. The following examples in Table 2 represent some of the many documented outcomes of the Trojan Warrior Project that may be relevant to first responders seeking to improve crisis decision making or other aspects of their performance.

Table 2. Trojan Warrior Project Sample of Outcomes.¹⁸⁰

	<i>Average % of increase</i>
To better manage stress and shock	85
To increase mental abilities	100
To coordinate mind, body and emotions	65
To strengthen leadership skills	40

Recently, Daniel Levinson et al. published a paper putting forth evidence demonstrating the many positive aspects of MT. Yet again, evidence can be shown that would appear to indicate a correlation between MT and enhanced first-responder crisis decision making. They begin, “Mindfulness practice of present moment awareness promises many benefits.”¹⁸¹ For instance, they discovered that certain skills learned during MT are “associated with more meta-awareness, less mind wandering, better mood, and greater non-attachment (i.e., less attentional capture by distractors formerly paired with reward).”¹⁸² This research also showed that four weeks of a particular element of MT (breath counting) “improved mindfulness and decreased mind wandering relative to working memory training and no training controls.”¹⁸³

¹⁷⁹ Ibid., 263.

¹⁸⁰ Source: Strozzi-Heckler, *In Search of the Warrior Spirit, Fourth Edition: Teaching Awareness Disciplines to the Green Berets*, 263.

¹⁸¹ Daniel B. Levinson et al., “A Mind You Can Count on: Validating Breath Counting as a Behavioral Measure of Mindfulness,” *Frontiers in Psychology* (October 24, 2014): 1, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4208398/>.

¹⁸² Ibid.

¹⁸³ Ibid.

The evidence presented previously for a correlation between MT and behavioral changes that would improve first-responder crisis decision making is noteworthy. Various credible studies have shown MT to produce desirable behavioral changes in first responders, members of the military, and athletes. Among these behavioral changes were lower levels of perceived stress, enhanced self-awareness, self-efficacy, leadership skills, observational skills, non-reactivity, non-judgment, mental abilities, emotional regulation, and concentration.

E. NEUROLOGICAL, PHYSIOLOGICAL, AND BIOCHEMICAL CHANGES

Several studies have provided evidence demonstrating positive neurological, physiological, and biochemical changes resultant from MT. This thesis proposes that many of these effects would be valuable to first responders in improving their crisis decision making abilities. For example, the University of Wisconsin-Madison's Richard Davidson has enumerated a number of ways that practicing mindfulness remakes the brain itself. Davidson contends that mindfulness "helps the brain disambiguate our emotions and provide a level of detachment from them."¹⁸⁴ According to Davidson, this ability to detach from emotions, often through a technique of "noting" or "labeling" them, sparks activity in the pre-frontal cortex, the rational and analytical part of the brain, and dampens activity in the portion of the brain referred to as the amygdala, a structure in the limbic system that triggers emotions, such as fear, and the fight or flight response.¹⁸⁵ A 2011 study conducted by researchers from Harvard University at Massachusetts General Hospital, which examined the results of an eight-week mindfulness meditation program, was the first to demonstrate through magnetic-resonance imaging, that meditation produced changes to the brain's gray matter.¹⁸⁶ This "increased gray-matter density [was seen] in the hippocampus, known to be important for learning and memory, and in structures associated with self-awareness, compassion, and introspection [and furthermore] decreased gray-matter density [was seen] in the amygdala, which is known

¹⁸⁴ Taylor Clark, *Nerve* (New York: Little, Brown and Company, 2011), 82.

¹⁸⁵ Ibid.

¹⁸⁶ Sue McGreevey, "Eight Weeks to a Better Brain," *Harvard Gazette*, January 21, 2011, <http://news.harvard.edu/gazette/story/2011/01/eight-weeks-to-a-better-brain/>.

to play an important role in anxiety and stress.”¹⁸⁷ Since this 2011 study, a variety of other studies have been conducted by different neuroscience laboratories that have sought to understand the complexities inherent in how meditation (a primary component of most MT programs) affects the brain. In 2015, a paper was published by a group of researchers from the University of British Columbia and the Chemnitz University of Technology, which evaluated evidence from a large number of studies to attempt to discover which portions of the brain are consistently impacted.¹⁸⁸ This “systematic review and meta-analysis”¹⁸⁹ of other studies aimed to answer two fundamental questions, “Is meditation associated with altered brain structure? If so, what is the magnitude of these differences?” The results of this review showed great promise for the potential for meditation to alter the brain in many different areas. This review found:

Eight brain regions consistently altered in meditators, including areas key to meta-awareness (frontopolar cortex/BA 10), exteroceptive and interoceptive body awareness (sensory cortices and insula), memory consolidation and reconsolidation (hippocampus), self and emotion regulation (anterior and mid cingulate; orbitofrontal cortex), and intra- and interhemispheric communication (superior longitudinal fasciculus; corpus callosum).¹⁹⁰

Evidence points to a likely correlation between MT and certain brain chemicals. Scientists studying how best to assist soldiers to “remain cool under fire”¹⁹¹ have demonstrated that a correlation may exist between those soldiers best able to manage stress, and lower levels of stress hormones, as well as increased levels of neuropeptide-Y, a hormone produced in the brain that when released reduces feelings of stress and fear. Deane Aikins of Yale University in New Haven, Connecticut, told reporters at the 2008 *American Association for the Advancement of Science Meeting* in Chicago that “There

¹⁸⁷ Ibid.

¹⁸⁸ Congleton, Hölzel, and Lazar, “Mindfulness Can Literally Change Your Brain.”

¹⁸⁹ Kieran C. Fox et al., “Is Meditation Associated with Altered Brain Structure? A Systematic Review and Meta-analysis of Morphometric Neuroimaging in Meditation Practitioners,” 1, *Neurosci. Biobehav. Rev.* 43 (June 2014): 48–73, doi:10.1016/j.neubiorev.2014.03.016.

¹⁹⁰ Fox et al., “Is Meditation Associated with Altered Brain Structure? A Systematic Review and Meta-analysis of Morphometric Neuroimaging in Meditation Practitioners,” 1.

¹⁹¹ Julie Steenuysen, “Research Shows Why Some Soldiers Are Cool under Fire,” *Reuters*, February 2009, www.reuters.com/article/2009/02/16/us-stress-soldiers-idUSTRE51F02B20090216.

are certain individuals who just don't get as stressed.”¹⁹² Aikens explained that blood samples taken from soldiers in training programs “showed those who fared best under extreme stress had lower levels of the stress hormone cortisol and higher levels of neuropeptide-Y, a chemical that dampens the body’s stress response” [and that], “mental training exercises such as meditation also might help improve the performance of soldiers under stress.”¹⁹³ While Dr. Aikens and his colleagues did not specifically study the effect of meditation or MT upon levels of cortisol or neuropeptide-Y, other studies have examined the effects of various mindfulness interventions on the release of cortisol, chief among the body’s stress hormones. Included among these studies was a study of a program consisting of five days of a type of meditation training referred to as integrative body-mind training (ICBM). Post training, the “experimental group showed less cortisol release, indicating a greater improvement to stress regulation. [Additionally] The experimental group also showed lower levels of anxiety, depression, anger and fatigue than was the case in the control group.”¹⁹⁴ Many different studies have identified reduced levels of cortisol in the body correlated to the application of a variety of meditation or mindfulness programs. Furthermore, it is relevant to point to a recently published paper that reviewed the available literature on the role of cortisol as a physiological marker for improvement with regards to mindfulness practice. This paper finds that “cortisol is a promising candidate to assess the effectiveness of interventions intended to reduce stress...and has generally been found to be responsive to interventions geared towards reducing stress.”¹⁹⁵

Additionally, significant enhancement of the cognitive neuroscience construct of working memory capacity (WMC) has been linked to mindfulness practice. WMC “is the ability to maintain relevant information online while resisting interference from irrelevant

¹⁹² Ibid.

¹⁹³ Steenuysen, “Research Shows Why Some Soldiers Are Cool under Fire.”

¹⁹⁴ University of Oregon, “Body-mind Meditation Boosts Performance, Reduces Stress,” ScienceDaily, October 9, 2007, www.sciencedaily.com/releases/2007/10/071008193437.htm.

¹⁹⁵ Rose H. Matousek, Patricia L. Dobkin, and Jens C. Pruessner, “Cortisol As a Marker for Improvement in Mindfulness-based Stress Reduction,” *Complement Ther Clin Pract.* 16, no. 1 (February 2010): 13–9, doi:10.1016/j.ctcp.2009.06.004.

information.”¹⁹⁶ Increasingly, evidence is indicating that working memory capacity is “tied to the ability to engage in abstract problem-solving and counter-factual thinking,”¹⁹⁷ both arguably very desirable abilities in regard to first-responder crisis decision making. In his book, *Mindful Nation*, Congressman Tim Ryan points out the benefits of increasing WMC through MT (which he refers to as *mind fitness training*) for first-responder crisis decision making. The Congressman writes:

Our working memory capacity can also be increased through training, which is why mind fitness training is potentially so important for people in the military, for police, for firefighters, for first responders to natural disasters, and for others who work in high- stress environments that require taking in and managing a great deal of information in short time frames.” [Interestingly, Ryan elaborates] “Having a stronger working memory capacity would obviously benefit someone operating in the midst of chaos. It would help them keep themselves and others safe. It would allow them to respond, not necessarily simply react-or overreact.”¹⁹⁸

Reporting on the results of pilot research, conducted in pre-deployment Marine reservists, Elizabeth Stanley and Amishi Jha propose:

Mind fitness can be maintained even in high-demand and high-stress contexts by regularly engaging in certain mental exercises. These exercises engage and improve certain core mental processes, such as working memory capacity, which lead to a more mentally agile, emotionally regulated, attentive, and situationally aware mode of functioning...the foundational skill cultivated in...our MMFT program is called ‘mindfulness.’ [and further] many studies have shown that mindfulness training improves different aspects of attention, which is the ability to remain focused on task-relevant information while filtering out distracting or irrelevant information.¹⁹⁹

¹⁹⁶ Elizabeth Stanley and Amishi Jha, “Mind Fitness and Mental Armor,” *Joint Force Quarterly* 55, October 2009.

¹⁹⁷ Ibid.

¹⁹⁸ Tim Ryan, *A Mindful Nation* (Carlsbad, CA: Hay House, Inc., 2012), 121.

¹⁹⁹ Elizabeth A. Stanley and Amishi P. Jha, “Mind Fitness: Improving Operational Effectiveness and Building Warrior Resilience,” U.S. Army, October 30, 2009, 147, https://www.army.mil/article/29549/Mind_Fitness__Improving_Operational_Effectiveness_and_Building_Warrior_Resilience.

The potential for MT as a worthwhile means to enhance first-responder crisis decision making is perhaps summarized best by Stanley, posits that mindfulness is effective in enhancing:

Attentional control and tolerance for challenging experience” [and continues] “attentional control and tolerance for challenging experience may lead to more effective decision making, even in complex, chaotic, ambiguous, and fast-changing environments. These two capacities strengthen our *situational awareness* [emphasis added].²⁰⁰

Stanley continues:

Improved situational awareness and self-control assist with consciously choosing the most effective course of action instead of being driven by habitual reactions, emotions, biases, expectations, or other perceptual filters. SA and self-control allow for the clearest assessment of available information and *support effective decision making* (emphasis added), which is the cornerstone of enhanced performance.²⁰¹

It has only been in relatively recent years that scientific and technological developments have allowed for the host of objective, valid, and reliable measurements of the wide variety of neurological, physiological, and biochemical changes that can be shown to be produced by certain meditative or mindfulness practices. It is likely with continued advances in science and technology that even more valid and comprehensive measures will soon be available, which will be important to watch for in the future. For the time being, it seems clear that these types of more objective evidence (as opposed to the more subjective and perhaps less valid behavioral indicators of mindfulness that have been available for many more years) have significantly strengthened the argument for the value of MT in a variety of settings.

F. COUNTERARGUMENTS AND CAUTIONS

Some authorities contend that the results of many of the studies concluding that MT produces measurable benefits are controversial in that they may be flawed, or biased. This argument proposes that MT has “eluded rigorous behavioral measurement [in that]

²⁰⁰ Elizabeth A. Stanley, *Handbook of Mindfulness* (New York: John Wiley & Sons, Ltd., 2014), 971.

²⁰¹ Stanley, *Handbook of Mindfulness*, 971.

to date, research has relied on self-reported mindfulness or heterogeneous MTs to infer skillful mindfulness practice and its effects.”²⁰² Whereas it is certainly tenable to conclude that self-reports of a variety of improvements to behavioral characteristics may be less reliable than other measures, many authorities have conceded that these types of data are legitimate and generally trustworthy evidence.²⁰³ Nevertheless, it is important to examine the particular strengths and weaknesses of the different types of statistics and evidence being examined in this thesis. Thus, it is relevant to respond to the criticism of self-reports as suspect by pointing out that a number of studies (several of which were examined in this thesis) have also provided more objective markers as evidence by demonstrating positive **neurological, physiological, and biochemical** changes resultant from MT.²⁰⁴

Various experts in the psychological community have criticized the recent surge in popularity of mindfulness by using the term “McMindfulness.”²⁰⁵ Jeremy Safran, PhD, writes somewhat disdainfully of mindfulness, “in recent years it has surged into mainstream prominence to be embraced with gushing enthusiasm by both popular culture and mainstream psychology.” [Safran insists] “up until recently there was no research comparing the effectiveness of mindfulness to anything else” [and also] “the research that has compared mindfulness based cognitive therapy to traditional cognitive therapy finds that the emperor has no clothes.” [However, he concedes] “Don’t get me wrong, I believe in mindfulness. I would not have practiced it in one form or another for the last forty years if I didn’t.”²⁰⁶ Safran is not alone as an advocate for MT who nonetheless points to

²⁰² Levinson et al., “A Mind You Can Count on: Validating Breath Counting as a Behavioral Measure of Mindfulness.”

²⁰³ Ruth A. Baer, Gregory T. Smith, and Kristen B. Allen, “Assessment of Mindfulness by Self-report: the Kentucky Inventory of Mindfulness Skills,” *Assessment* 11, no. 3 (September 2004): 191–206, <http://www.ncbi.nlm.nih.gov/pubmed/15358875>.

²⁰⁴ For instance, refer to Levinson et al. “A Mind You Can Count on: Validating Breath Counting as a Behavioral Measure of Mindfulness,” 1; McGreevey, “Eight Weeks to a Better Brain”; Fox et al., “Is Meditation Associated with Altered Brain Structure? A Systematic Review and Meta-analysis of Morphometric Neuroimaging in Meditation Practitioners”; Steenuysen, “Research Shows Why Some Soldiers Are Cool under Fire.”

²⁰⁵ Jeremy D. Safran, “McMindfulness: The Marketing of Well-Being,” *Psychology Today*, June 13, 2014, <https://www.psychologytoday.com/blog/straight-talk/201406/mcmindfulness>.

²⁰⁶ Ibid.

a relative lack of scientific evidence demonstrating a reliable correlation between MT and mindfulness. Many other experts in the realms of psychology, psychiatry, and neuroscience share this optimism tempered by a measure of apprehension. For instance, Dr. Peter Malinowski, founder of the Meditation and Mindfulness Research Group at Liverpool John Moores University, cautions in regard to the benefits of MT and meditation programs, “more high quality research is desperately needed and...until evidence is strong one would be well-advised to be modest and careful with our claims.”²⁰⁷

Other critics have commented, “many of the controlled studies did not adequately control for placebo effects [and that] observational studies have a high risk of bias owing to problems such as self-selection of interventions.”²⁰⁸ By “self-selection of interventions,” the authors are referring to the idea that individuals who hold a favorable opinion of mindfulness or meditation or who have previously practiced meditation may be more likely to participate in a MT or meditation program and to report positive effects. While self-selection bias in certain behavioral studies may in fact be accurate, it is important to remember that no such opportunity exists for this type of bias in the neurological and physiological studies that have been done. Moreover, even accounting for the possibility of self-selection bias in certain studies, it would appear to indicate that at a minimum, at least those first responders who “self-select” for participation in a MT program due to a personal bias in favor of MT, may be likely to realize similar benefit.

This enthusiasm for MT tempered by an acknowledgement that the available evidence thus far is less than conclusive seems to be a common refrain within the psychological community. The idea of mindfulness as it is currently being marketed has come on very quickly over a relatively short period of time. While a large number of psychological authorities, as well as everyday practitioners of mindfulness continue to

²⁰⁷ Peter Malinowski, “Mindfulness Research—Where Are We Here and Now?” *Mediation Research*, February 1, 2014, <http://meditation-research.org.uk/2014/02/mindfulness-research-where-are-we-here-and-now/>.

²⁰⁸ Madhav Goyal et al., “Meditation Programs for Psychological Stress and Well Being: A Systematic Review and Meta-Analysis,” *JAMA Intern Med.* 174, no. 3 (2014): 357–368, <http://archinte.jamanetwork.com/article.aspx?articleid=1809754>.

attest to its usefulness, the empirical evidence available in the literature thus far has been somewhat mixed, and it will take time to determine with more certainty and specificity what actually are the benefits of MT and practice.

Additional concerns are brought forth by Miguel Farias and Catherine Wikholm, who complain, “with mindfulness-based approaches there is little space for one’s individuality, in part because it’s a group practice, but also because there has been no serious attempt to address how individuals react differently to this technique.”²⁰⁹ They go on to warn that mindfulness presents “potential for emotional and psychological disturbance [that] is rarely talked about by mindfulness researchers, the media, or mentioned in training courses.”²¹⁰ Similarly, Elizabeth Stanley, the creator of MMFT described previously, in advocating for MMFT as effective for military and first responder populations, cautions against use of the more well-known MBSR for these particular groups. She counsels:

While MBSR develops mindfulness with the body scan, awareness of breathing, and mindful yoga, MMFT acknowledges that these methods for developing mindfulness may initially be too intense for individuals with prior deployment or trauma histories [as these individuals] often have deployment or work histories or earlier life experiences that exposed them to significant or prolonged stress or trauma. In this context, the acute awareness of body sensations developed through mindfulness can lead to excessive activation of the autonomic nervous system, including flashbacks, nightmares, intrusive thoughts, heightened restlessness, panic attacks, irritation, and hyperarousal.²¹¹

Stanley, Farias, and Wikholm all raise a very important issue, in particular in the context of considering MT for first responders who are more likely to have experienced significant trauma during the course of their work than would the general population. It will be imperative to bear in mind moving forward that the various study samples being considered may not be representative of a typical first responder population. This

²⁰⁹ Miguel Farias and Catherine Wikholm, “Mindfulness or McMindfulness,” *Science 2.0: The Conversation*, June 2015.

²¹⁰ Ibid.

²¹¹ Stanley, *Handbook of Mindfulness*, 974.

potential “lack of generalizability”²¹² between first responder populations and those outside of the first responder community, as well as prospectively a similar lack of generalizability between particular segments of the first responder population itself (police vs. fire vs. EMS; urban vs. suburban vs. rural; experienced vs. inexperienced, etc.) may skew the data, and might obscure contraindications or other plausible negative consequences. Any proposed MT program for first responders should have as a paramount theme the well-known Hippocratic injunction “*primum non nocere*, above all, do no harm!”²¹³

G. CONCLUSION

A review of the evidence about the impact of MT reveals a common and widespread theme of a potential correlation between MT and the generation or enhancement of certain human factors, skills, and abilities, such as self-awareness, working memory capacity, attentional control, avoidance of narrowing of focus (tunnel vision), stress management and /adaptation, non-reactivity, capacity to observe and perceive, and comprehension ability, all of which were identified earlier in this thesis as essential to improving SA and sensemaking. However, a common stance within the psychological community is enthusiasm for MT modulated by admission that the available evidence thus far is less than conclusive. Additionally, it is imperative to highlight the cautions pointed out by credible authorities that have warned of the potential for MT to produce adverse emotional or psychological reactions among certain populations. Importantly, the search for literature that focuses specifically on a correlation between MT and enhanced first-responder crisis decision making uncovered no such evidence, revealing that a gap in the research exists.

²¹² Walter A. Kukull and Mary Gangulli, “Generalizability,” *Neurology* 78, no. 23 (June 5, 2012): 1886–1891, doi:10.1212/WNL.0b013e318258f812.

²¹³ Cedric M. Smith, “Origin and Uses of *Primum Non Nocere*—Above All, Do No Harm!” *Journal of Clinical Pharmacology* 45, no. 4 (April 1, 2005): 373.

IV. ANALYSIS

Nothing is more difficult, and therefore more precious, than to be able to decide.

—Napoleon Bonaparte

A. INTRODUCTION

To answer the primary research question, *Would MT be worthwhile as a means to enhance first-responder crisis decision making?* This section of the thesis aims to synthesize the evidence presented previously to determine what the predominant paradigms, frameworks, models, and systems demonstrate about how first responders make decisions during crises, and from that, to elicit what are the most common *human factors, skills, and abilities* that correlate with enhanced first-responder crisis decision making. Once these human factors, skills, and abilities were distilled from the evidence, an analysis was conducted to determine what has been the impact of mindfulness training on these specific *human factors, skills and abilities*. The thesis conclusion is dependent on the strength of the correlation drawn in this analysis section between the enhancement of crisis decision making and possession of these specific human factors, skills, and abilities, and in turn, the correlation drawn between MT and generation or improvement of these specific human factors, skills, and abilities.

It has been demonstrated that MT is likely to result in positive effects, such as improvement to working memory capacity, attentional control, tolerance for challenging experience, awareness, and the elimination or reduction of negative emotions, biases, and expectations. Additionally, mindfulness appears to have a positive correlation on the capacity to respond rather than to react, as well as “ability to engage in abstract problem-solving and counter-factual thinking, [and the facility] to remain focused on task-relevant information while filtering out distracting or irrelevant information.”²¹⁴

²¹⁴ Stanley and Jha, “Mind Fitness: Improving Operational Effectiveness and Building Warrior Resilience,” 148.

B. BENEFITS OF MT THAT CORRELATE TO ENHANCED CRISIS DECISION MAKING

1. Improved Working Memory Capacity

Earlier in this thesis, it was argued that RPD, a model of naturalistic decision making that relies heavily on pattern recognition, is the predominant crisis decision making framework used by first responders. Differences in analytical and intuitive decision making were discussed, and it was pointed out that effective crisis decision making, although it may rely primarily on intuitive thinking, must at times blend intuition with analysis. Kahneman states that Herbert Simon defines intuition as “the situation has provided a cue; this cue has given the expert access to information stored in memory; and the information provides the answer. Intuition is nothing more and nothing less than recognition.”²¹⁵ If correct, Simon’s definition of intuition is quite relevant to this thesis research, because, as Kahneman points out, “Simon’s strong statement reduces the apparent magic of intuition to the everyday experience of memory.”²¹⁶ Evidence has been put forth previously that MT enhances WMC. Therefore, a correlation appears to exist in this instance between MT and WMC, and consequently, a correlation between MT and enhanced first-responder crisis decision making.

2. Improved Situational Awareness and Sensemaking Skills and Abilities

It has been shown that crisis decision making errors are generally the result of inadequate SA or sensemaking,²¹⁷ or due to the effects of cognitive bias.²¹⁸ MT exhibits great promise for its potential to enhance SA and sensemaking, as well as to mitigate the negative effects of cognitive bias (essentially through enhancing the decision-maker’s self-awareness, which would consequently include cognizance of their own cognitive biases). SA stems from attention, focus, avoiding distraction, WMC, and perceiving cues and clues. In addition to its evidenced positive effects on WMC, MT has been demonstrated in this thesis to also enhance attentional control, or focus. Klein contends,

²¹⁵ Kahneman, *Thinking, Fast and Slow*, 237.

²¹⁶ Ibid.

²¹⁷ Stanley, *Handbook of Mindfulness*, 971.

²¹⁸ Kahneman, *Thinking Fast and Slow*.

“SA is the basis for decision making in most cases”²¹⁹ and Gasaway observes that developing and maintaining SA “becomes the driving factor in the decision making process.”²²⁰ Klein makes the case for a strong correlation between levels of attentional control and working memory capacity, and level of SA. He states, “the ability to remember discrete data elements may be important for establishing SA because *inattention* (emphasis added) to the data results in a weak basis for making interpretations [and further] limitations in SA, perhaps due to *working memory capacity or inadequate attentional control* (emphasis added), may result in errors.”²²¹

The importance of SA and sensemaking to first-responder crisis decision making was discussed at length previously in the thesis. MT has been demonstrated to heighten levels of *meta-awareness*, which is “being consciously aware of your own awareness.”²²² Gasaway contends, “situational awareness is fragile, [and] can be lost in ways so subtle that it may erode before a responder even realizes it is gone.”²²³ One way to mitigate against this loss of SA, according to Gasaway, and others, may be the development of meta-awareness. Development of meta-awareness appears to be likely to improve the more nuanced sensemaking as well. Meta-awareness may make more likely a first responder’s choice to “get on the balcony” during chaotic or novel situations, as suggested by Heifetz to create some distance from the chaos to gain perspective, and hence, to attain and maintain SA, and to make sense. Oftentimes, this sensemaking takes the form of recognition of key patterns; however, in novel scenarios, sensemaking may instead result in an awareness of novelty, and therefore, the need for analytical and perhaps creative decision making. Heifetz offers a cautionary tale in regard to the idea of novel threat, “When a leopard threatens a band of chimpanzees, the leopard rarely succeeds in picking off a stray. Chimps know how to respond to this kind of threat. But

²¹⁹ Gary Klein, “Analysis of Situation Awareness Reports from Critical Incident Reports,” in *Situation Awareness Analysis and Measurement*, ed. Micah R. Endsley and Daniel J. Garland (Mahwah, NJ: Lawrence Erlbaum Assoc., 2000), 52.

²²⁰ Endsley. “The Role of Situation Awareness In Naturalistic Decision Making,” 269–292.

²²¹ Klein, “Analysis of Situation Awareness Reports from Critical Incident Reports,” 51.

²²² Richard Gasaway, “Awareness about Awareness,” SAMatters.com, accessed July 11, 2016, <http://www.samatters.com/meta-awareness/>.

²²³ Ibid.

when a man with an automatic rifle comes near, the routine responses fail. Chimps risk extinction in a world of poachers unless they figure out how to disarm the new threat.”²²⁴ Similarly, when first responders are unable to recognize a novel crisis, lacking a typical pattern, they will be prone to implement a routine, or a favored response, as opposed to a more creative one, and the likelihood of adverse outcomes will be high. Essentially, mindfulness is getting on Heifetz’s balcony.

It was discussed previously in this thesis that first responders must make decisions and take action at a medley of crises that vary widely in their degree of complexity. The *Cynefin framework* was demonstrated to be a sensemaking tool that has great potential to assist first responders with comprehending how best to select a particular decision making style or method that will correspond with the context of the particular event with which they are confronted. It has been seen that often first responders will tend to apply a favored decision making method to different scenarios, despite the fact that disparate situations call for different decision making frameworks. When a decision-maker is unable to employ the correct decision making methods appropriate to the level of complexity inherent in the particular crises he is attempting to resolve, a risk, or even a likelihood exists that the event will slip into chaos, or disorder. Essentially, the degree to which first responders will be able to use the *Cynefin framework* effectively as a problem-solving tool appears to be correlated to individual levels of *sensemaking* skills, and *self-awareness*, among a host of many other cognitive abilities, which this thesis argues may be enhanced through MT.

3. Enhanced Self-Awareness and Improved Attentional Control

The term, *self-awareness*, has become almost cliché in today’s culture, particularly in the realm of the various self-improvement literature, podcasts, and other sources of pop-psychology. Nonetheless, despite a likely (and perhaps healthy) cynicism at the thought of heightened self-awareness being some sort of panacea to all of life’s travails, the evidence clearly does point to the very substantial value of self-awareness in

²²⁴ Ronald A. Heifetz and Donald L. Laurie, “The Work of Leadership,” *Harvard Business Review*, January–February 1997, 126, <http://www4.ncsu.edu/unity/users/p/padilla/www/435-Leadership/Heifetz%20and%20Laurie%20The%20work%20of%20leadership.pdf>.

many things, including first responder performance and crisis decision making. MT teaches awareness, which involves the detachment and observation of the self, and therefore, may make it more likely that decision makers will identify their own faulty or erroneous intuition.²²⁵ As earlier discussed, first responder crisis-decisions most often take the form of a predominately intuitive process, which is generally effective. However, at times, intuition may prove faulty due to the influence of a variety of cognitive biases, or the effects of stress, or simply due to the fact that a decision-maker is confronted with a novel scenario at which the intuitive process (which is basically pattern matching based on memories of previous incidents or training scenarios) is inadequate to the situation at hand. Amplifying upon the previous discussion, Zimmerman and Blake write about the effects of cognitive bias in crises events involving law enforcement officers. They offer, “training and experience...create unconscious patterns, called schema, that allow for quick assessments and generally accurate judgments.”²²⁶ Conversely, Zimmerman and Blake note that this reliance on patterns, or schema, can create an unconscious cognitive bias, particularly when the time in which to make decisions is limited. This bias, they assert, “can lead to inappropriate decisions [which can] result in tragic errors, if novel or unexpected cues and clues go un-noticed during a rapidly unfolding and stressful event.”²²⁷ Based upon my personal experience as a fire chief in an urban setting, I would comment that Zimmerman and Blake’s assertions in regard to cognitive bias and schema are applicable to crisis events in fire service settings as well. Moreover, I have come to conclude that MT enhances self-awareness, and that in turn this self-awareness serves to aid in elimination of cognitive bias, not only based upon the evidence in the literature that this thesis points to, but additionally through improvements in the elimination of cognitive bias in my own crisis decision making that I have experienced resultant from MT.

This thesis asserts that Boyd’s OODA loop is a valuable crisis decision making framework that all first responders would be well advised to use. MT may enable first

²²⁵ Kahneman, *Thinking Fast and Slow*.

²²⁶ Zimmerman and Blake, *Officers Facing Criminal Charges; Faulty Decision Making?* 5.

²²⁷ Ibid.

responders to grasp more fully the power of Boyd's OODA cycle during crisis events. One of the keys to the effectiveness of OODA is the emphasis on the action steps in the middle of the loop, *orient* and *decide*. It is mentioned in this thesis that often, during a crisis event, first responders may tend to be reactive, to a fault. During highly stressful and time sensitive scenarios, the tendency may be to observe, and then to simply act (react) without a deliberate process of orienting to the relevant cues and clues (sizing up and or making sense), filtering out the irrelevant, distracting details, and then making an informed decision in regard to the appropriate action to take. During crisis, as the stakes increase, and the time available to take action decreases, it quite obviously becomes more and more difficult to collect the relevant data (orient) and to process it (decide) before initiating action. If responders cannot interrupt their unconscious reaction during these situations, no decision will be made, per se. There will simply be a response to a stimulus. This response may be negatively impacted by unconscious cognitive bias. This type of overly reactive decision making, often referred to as "fight, flight, or freeze," has the great potential to result in negative outcomes. The OODA loop emphasizes the fact that no matter how small the space between stimulus and response, a space does *exist* in which a well-trained (mindful) decision-maker can *choose* a response, rather than to mindlessly react, as shown in Figure 6. MT has been shown to reduce levels of stress and fear, to improve attentional control (focus), and to enhance self-awareness, all of which would serve to increase the probability of responders effectively utilizing the OODA cycle during crisis decision making, which would in turn, raise the odds of quality decisions being made.

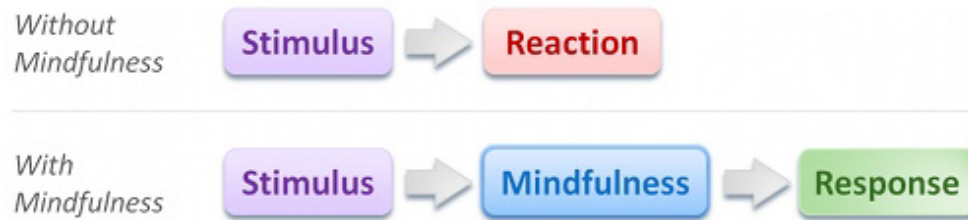


Figure 6. Diagram Drawn by Redima (Randy) Fernando of Mindful Schools.²²⁸

Dr. Clyde Smallman is emphatic in his enthusiasm for the benefit of mindfulness applied to decision making saying:

By far the most valuable skill in decision making is the development of mindfulness that allows you to make sense of the present moment: intentional accepting and nonjudgmental focus of one's attention on the emotions, thoughts and in the present moment. In other words, it's about being actively engaged in the present and noticing new things.²²⁹

4. Reduced Feelings of Stress, Threat, and Fear

Although scholars, such as the aforementioned Kowalski and Vaught, have pointed out that the effects of *stress* upon first-responder crisis decision making remain underexplored, it is nevertheless apparent that stress, and its attendant demands that are often present during crisis, such as “noise, threat, time pressure, task load, coordination requirements, fatigue, and other task and environmental demands,”²³⁰ are known to have deleterious effects on various aspects of performance, and these would appear to correlate with first-responder crisis decision making. It is axiomatic that crises are commonly characterized by feelings of threat and fear. Ancona explains, “threat and fear are associated with rigidity, a need for direction, and erratic behavior- which work against effective sensemaking.”²³¹ Moreover, Kathleen M. Kowalski-Trakofler, Charles Vaught,

²²⁸ Source: Sean Murphy, “Cultivating Mindfulness,” SKMurphy, accessed June 21, 2016, <http://www.skmurphy.com/blog/2014/07/28/cultivating-mindfulness/>. Redima (Randy) Fernando of Mindful Schools.

²²⁹ Clive Smallman, “We Are the Change We Seek, The Importance of Mindfulness to How We Make Decisions,” accessed July 10, 2016, <https://clivesmallman.org/2015/09/12/the-importance-of-mindfulness-to-how-we-make-decisions/>.

²³⁰ Szalma and Hancock, *Performance under Stress*, 271.

²³¹ Ancona, “Chap 1: Sensemaking: Framing and Acting in the Unknown,” 12.

and Ted Scharf have indicated that stress “restricts cue sampling, decreases vigilance, reduces the capacity of working memory, causes premature closure in evaluating alternative options, and results in task shedding.”²³² Pfeifer adds, “The stress of the crisis creates a psychological force that limits emergency responders’ cognitive ability to adapt to unfolding events.”²³³ Ergo, feelings of stress, threat, and fear will have an adverse ramification on crisis decision making. In chaotic or novel scenarios, feelings of threat or fear have on rare occasion manifested to the point of rendering key decision-makers as completely ineffective as “deer in the headlights.”

Blum and Polisar call for police officers to be provided with:

Systematic program(s) of mental and emotional—that is, work fitness-conditioning that can carry them through an unexpected crisis without loss of poise or self-control in a tactical (or politically sensitive) encounter [and further] systematic in-house training efforts in how to recognize, manage, and control the symptoms generated by work stresses that are inescapable in police work [that would develop] adaptive expertise in their management and control of their bodies’ reactions to alarm, threat, and psychosocial stresses encountered over time.²³⁴

As explained earlier in this thesis, MT programs are currently available that would appear to have good potential to provide for much of which Blum and Polisar are advocating. It is also feasible that MT programs could be customized to match the specific needs and wishes of individual first responder disciplines or even particular organizations within individual disciplines.

MT appears to correlate well with the reduction of the negative impacts of stress. Taylor Clark, in *Nerve*, offers, “the best cognitive approach to fear and anxiety can be summed up in a single word. It’s called *mindfulness* (emphasis added).”²³⁵ Research conducted at Florida State’s Human Performance Lab has demonstrated that, “Under stress, our natural tendency is to forget about our surrounding environment and focus

²³² Kathleen M. Kowalski-Trakofler, Charles Vaught, and Ted Scharf, “Judgment and Decision Making under Stress: An Overview for Emergency Managers,” *Int. J. of Emergency Management* 1, no. 3 (2003): 278–289.

²³³ Pfeifer, *Crisis Leadership: The Art of Adapting to Extreme Events*, 3.

²³⁴ Blum and Polisar, “Why Things Go Wrong in Police Work.”

²³⁵ Clark, *Nerve*, 78.

instead on the immediate threat. The more people can resist this and pay attention to what's really happening, the better they do under fire.”²³⁶ Fabiny assents, adding, “Though you may not be able to eradicate the roots of stress, you can minimize its effects on your body. One of the easiest and most achievable stress relieving techniques is meditation.”²³⁷ Fabiny claims that the mechanism by which meditation attenuates the effects of stress is “its effects on the sympathetic nervous system”²³⁸ (lower relative heart and respiration rates, and blood pressure during stressful events).²³⁹

The positive effects of MT upon stress appear to be not only behavioral, but physiological and biochemical as well. MT has been demonstrated to reduce the levels of stress hormones, such as cortisol, to lower respiration rate, heart rate, and blood pressure, and to improve the function of the brain, all of which correlate to reduction of feelings stress, threat, and fear.²⁴⁰ Grossman has written extensively about crisis decisions faced by police officers, particularly during violent conflict. He emphasizes the importance of breathing techniques during stressful situations to improve performance via reduction of anxiety and control of heart rate and other physiological responses.²⁴¹ Most MT programs teach various iterations of breathing techniques, all of which appear to serve to activate the parasympathetic nervous system, which then generates an almost instantaneous relaxation response.²⁴² Consequently, as sound evidence is available that breathing techniques taught in MT programs are effective in reducing stress, as well as evidence that reduced stress correlates to improved first-responder crisis decision making, it is argued in this thesis that this is evidence of correlation between MT and improvement to first-responder crisis decision making.

²³⁶ Clark, *Nerve*, 120–21.

²³⁷ Fabiny, “What Meditation Can Do for Your Mind, Mood, and Health.”

²³⁸ *Ibid.*

²³⁹ *Ibid.*

²⁴⁰ *Ibid.*

²⁴¹ Grossman, *On Combat: The Psychology and Physiology of Deadly Conflict in War and Peace*.

²⁴² S. Novotny, “The Science of Breathing,” *IDEA Fitness Journal* 4, no. 2 (February 1, 2007), <http://www.ideafit.com/fitness-library/science-breathing>.

5. Wisdom and Bravery

Elizabeth Stanley, in her work, *Mindfulness-Based Mind Fitness Training: An Approach for Enhancing Performance and Building Resilience in High-Stress Contexts*, explains, “in the course of mindfulness practice, we also cultivate wisdom and bravery. Together these two qualities are a pathway towards effective action in any sphere, but especially in high-stress environments.”²⁴³ Wisdom and bravery, positive attributes in virtually any context, have particular value in the realm of first-responder crisis decision making. It requires wisdom to see clearly how things are in the present moment, to be aware of and to compensate for the various biases, filters, and pre-conceived notions that all humans possess, in one form or another. It takes bravery to remain “all in” mentally and emotionally, regardless of how threatening, stressful, lonely, difficult, or frightening a situation may be. It requires wisdom **and** bravery for a leader to make difficult (and correct), and often, unpopular decisions swiftly in dangerous and emotionally fraught situations. Wisdom and bravery are certainly essential in directing subordinates to place their own lives at risk to accomplish the objectives that the leader has set.

6. Significance of Availability of New Research Techniques

It is imperative to take into account the recent developments in neuroimaging and other scientific and technological developments in cognitive neuroscience that have allowed for an understanding of the previously unrevealed neural effects of MT.²⁴⁴ This thesis presented evidence from numerous neurological studies that have demonstrated that “meditation may be like actual brain exercise,”²⁴⁵ triggering observable and beneficial changes to the neurological, physiological, and biochemical systems. Research in *neuroplasticity*²⁴⁶ has demonstrated that the structure of the brain is altered by regular engagement in certain activities, among them meditation, and a variety of other

²⁴³ Elizabeth A. Stanley, *The Wiley Blackwell Handbook of Mindfulness*, ed. Amanda Ie, Christelle T. Ngnoumen, and Ellen J. Langer (New York: Wiley Blackwell, 2014), 965.

²⁴⁴ West, *The Psychology of Meditation*.

²⁴⁵ “Mindfulness Meditation: A Mental Workout to Benefit the Brain,” August 15, 2103, <http://sitn.hms.harvard.edu/flash/2013/mindfulness-meditation-a-mental-workout-to-benefit-the-brain/> on.

²⁴⁶ West, *The Psychology of Meditation*.

mindfulness practices. A 2015 article in the *Harvard Business Review* written by three leading mindfulness researchers states:

Neuroscientists have also shown that practicing mindfulness affects brain areas related to perception, body awareness, pain tolerance, emotion regulation, introspection, complex thinking, and sense of self.” [They continue] “Mindfulness should no longer be considered a ‘nice-to-have’ for executives. It’s a ‘must-have’: a way to keep our brains healthy, to support self-regulation and effective decision making capabilities, and to protect ourselves from toxic stress.”²⁴⁷

Certainly, the word “executives” mentioned in the quote could very easily, and appropriately, be substituted with “first responders.”

C. CONCLUSION

Earlier, it was explained that the ultimate goal of this research was to explore how an understanding of the concept of mindfulness and MT, might potentially improve (or perhaps not) the decision making abilities of first responders whose decisions will affect the ultimate outcome of crisis events. The intent of the research and analysis was to attempt to draw connections utilizing an “if this _____ then _____” process of first, describing for the reader how first responders make decisions during a crisis response through an examination of the various decision making paradigms, models, frameworks, and systems relevant to understanding crisis decision making, and subsequently, identifying the human factors, skills, and abilities that correlate with effective first-responder crisis decision making, and also the various human factors, problems, and difficulties that impede effective crisis decision making. Then, evidence was examined to determine the efficacy of MT in producing these positive human factors, skills, and abilities, and reducing the negative human factors, problems, and difficulties. It was theorized that if the evidence led to a conclusion that MT does in fact produce or enhance the “things” that contribute to good crisis decision making, and reduce or eliminate the “things” that contribute to poor crisis decision making, then it would lead to a conclusion that the potential for MT to be worthwhile as a means of enhancing first-responder crisis decision making is good.

²⁴⁷ Congleton, Hölzel, and Lazar, “Mindfulness Can Literally Change Your Brain.”

The previous analysis demonstrates that sufficient evidence exists to warrant serious consideration for further study or application of this theory in the field that is discussed in more detail as follows.

V. FINDINGS

A. KNOWLEDGE GAPS AND LIMITATIONS, AND OPPORTUNITIES FOR FUTURE RESEARCH

In light of this abundance of promising evidence for the wide variety of positive behavioral, neurological, physiological, and biochemical changes that may occur as a result of MT, it is reasonable to conclude that further research is warranted in the potential application of mindfulness to improve first-responder crisis decision making. Research questions could focus on comparing and contrasting the various MT systems available as they relate specifically to improvements in first responder decision making during crisis events. Is it possible to obtain empirical evidence that MT produces measurably improved outcomes in IC decision making during complicated, complex, or chaotic events? Is one MT system more effective than others? Are different systems more or less relevant to particular first responder disciplines (law enforcement vs. fire vs. EMS; urban vs. suburban vs. rural, etc.)? Should systems be designed that are customized for particular disciplines, or even for individual agencies? Does the evidence support investment of scarce resources of time and money on MT vs. other types of leadership and decision making training? Furthermore, improvements to the manner in which the outcomes of various MT programs and techniques are evaluated are sorely needed, as too much reliance is currently placed on self-report measures. Future mindfulness research should focus on the development of more reliable, valid, and objective assessments, such as neuroimaging, blood work, analysis of gut bacteria, and other empirical measures.

Other areas ripe for future research are analyses of additional potential benefits that may accrue to first responder organizations resultant from participation in MT programs, such as increased health and wellness of employees, which would likely lead to increased production and lowered health care and other costs. Examples are available of the potential for financial benefit to accrue to organizations and municipalities that would implement MT programs. For instance, a team of Harvard researchers who studied an eight-week mind-body relaxation program that included “meditation, yoga,

mindfulness, cognitive behavioral skills, and positive psychology,”²⁴⁸ offered through Massachusetts General Hospital found that participants in this program “used 43% fewer medical services than they did the previous year.”²⁴⁹ This number was correlated by these researchers to represent potential savings on health care costs “of anywhere from \$640 to as much as \$25,500 per patient per year.”²⁵⁰ The article in the *Harvard Business Review* referencing the aforementioned study also reports that an Aetna employee mindfulness program realized “an increase in worker productivity worth \$3,000 per employee per year,”²⁵¹ in addition to a variety of self-reported benefits accruing to the employees themselves, such as improvements to perceived stress, sleep, and pain tolerance.²⁵² Last, an apparent opportunity does exist to be realized in the development of various MT technology and applications that might potentially be designed specifically with first responders in mind, or even targeted to particular first responder disciplines, such as law enforcement, fire service, EMS, etc.

B. RECOMMENDATIONS AND IMPLEMENTATION

Despite the abundance of indicators pointing to mindfulness as potentially valuable in this domain, a review of the literature reveals what appears to be a relative lack of interest shown thus far by first responder organizations in the application of MT and practice toward enhancing first-responder crisis decision making. Several plausible reasons for this disinterest can be found. One rationale for first responder reluctance to consider the incorporation of MT as a component of crisis decision making training may be the association of meditation with Eastern religious practices, or the assumption that those who practice meditation are “soft,” or “out there.” Congressman Tim Ryan, author of *A Mindful Nation*, reveals that in his experience, “a lot of the military people thought

²⁴⁸ Marlynn Wei, “Yoga and Meditation Offer Health Care Savings—and You Can Do Them at Home,” *Harvard Health Publications: Harvard Medical School*, November 18, 2015, <http://www.health.harvard.edu/blog/yoga-and-meditation-offer-health-care-savings-and-you-can-do-them-at-home-201511188616>.

²⁴⁹ *Ibid.*

²⁵⁰ *Ibid.*

²⁵¹ *Ibid.*

²⁵² *Ibid.*

that anyone who meditated was just too soft to make a serious decision.”²⁵³ Martin E. P. Seligman and Mihaly Csikszentmihalyi warn of a significant societal misperception that presents a major barrier that must be accounted for by those seeking to convince first responders to embrace MT: “One legacy of the humanism of the 1960s is prominently displayed in any large bookstore: The ‘psychology’ section contains at least 10 shelves on crystal healing, aromatherapy, and reaching the inner child for every shelf of books that tries to uphold some scholarly standard.”²⁵⁴ Therefore, it is important to acknowledge that within the first responder community, a similar skepticism in regard to the potential benefits of MT would be a likely reaction if and when it is proposed. Anticipating and understanding this apprehension will be crucial in effectively implementing solutions to overcome it.

A deliberate focus on the strong neurological, physiological, and biochemical evidence, as opposed to the behavioral evidence for the effectiveness of mindfulness, may help to gain acceptance within the first responder community. The more objective nature of the neurological and physiological evidence would likely be far more effective in convincing first responders, who tend to possess a healthy skepticism by nature, of the potential benefit of MT. Another tactic that would plausibly have worth in the attempt to persuade first responders to consider the potential benefit of MT to crisis decision making would be to point out instances in which western sports teams and military units have experimented with or implemented mindfulness programs. It has also been shown that, for first responders, who tend to be “physically oriented people [oftentimes] movement-oriented therapies [are] an easier place to start than ones that deal primarily with thoughts.”²⁵⁵ Moreover, it has been demonstrated that “there is a profound parallel between physical fitness and mind fitness.”²⁵⁶ Accordingly, although it is beyond the scope of this thesis to advocate for any particular system or school of thought, it can be

²⁵³ Ryan, *A Mindful Nation*, 129.

²⁵⁴ Martin E. P. Seligman and Mihaly Csikszentmihalyi, “Positive Psychology: An Introduction,” *American Psychologist* 55, no. 1 (February 2000): 7.

²⁵⁵ Ryan, *A Mindful Nation*, 132.

²⁵⁶ Elizabeth A. Stanley and Amishi P. Jha, “Mind Fitness and Mental Armor: Enhancing Performance and Building Resilience,” *Joint Force Quarterly* 55 (4th Quarter 2009): 7.

inferred that any type of mindfulness program designed for the purpose of improving first responder performance should include not only meditation or visualization practices, but would also likely benefit some aspect or aspects of physical movement, such as walking meditation, yoga, stretching, tai chi, aikido, or any of the many other holistic “mind-body” practices that exist.

Goerling remarks upon his experiences with first responders who have “resisted mindfulness because they misunderstood it as passivism or hippy thinking,”²⁵⁷ which is likely a common misperception among responders. He counters this narrative with his own, “Mindfulness is by my definition the cultivation of the practice of being present. It’s really that simple. It’s powerful to be self-aware and it comes from the Warrior Ethos of knowing yourself.”²⁵⁸ Branding mindfulness and MT with terms such as “powerful” and “Warrior” may have a positive effect in regard to acceptance. Goerling also objects to the notion held by first responders who may initially perceive mindfulness as something that may cause them to become “soft” or “too slow.” He asserts that despite MT’s intention to teach individuals how to be present to slow down the mind during crises, no correlation exists to any slowing down “in terms of time or space.”²⁵⁹ In fact, the intent of MT for first responders is quite the opposite, to enable more effective crisis decision making, which results in lives and property saved, and order restored, more rapidly, not less.

Certainly, the crafting of discipline specific and culturally relevant (law enforcement vs. fire vs. EMS) MT systems may assist with easier acceptance of such training programs by first responders. It is often difficult to overcome the strong social identities held by members of these “tribes.” First responders may be more likely to take part in MT that they believe has been designed specifically for their particular profession as opposed to a more generic version of MT. Furthermore, responders may be somewhat less likely to feel vulnerable as the result of participation in what to them will initially be

²⁵⁷ Goerling, “Warrior Resilience: Teaching Mindful Integration in Law Enforcement Culture and Training,” 3.

²⁵⁸ *Ibid.*, 2.

²⁵⁹ *Ibid.*, 4.

a very novel activity, if the training (particularly the initial training) excludes those who are not members of the profession with which they identify so strongly.

Seeking the cooperation of management (International Association of Fire Chiefs, International Association of Chiefs of Police, International City Managers Association, as well as mayor's and governor's associations) along with labor organizations (International Association of Firefighters (IAFF), National Association of Police Organizations, International Union of Police Associations, AFL-CIO, National Emergency Medical Services Association, International Association of EMT's and Paramedics) etc. is strongly recommended, as these organizations have been and are very influential among their respective memberships, and most of these organizations have a strong track record of seeking and embracing programs and opportunities that hold promise to benefit not only their respective members but the public as well.

Finally, grant funding from a variety of sources may be available for individual departments, organizations, or localities that wish to pursue MT for first responders. Funding may be available to reimburse for the costs associated with necessary facilities and instructors, as well as to compensate individual participants.

THIS PAGE INTENTIONALLY LEFT BLANK

VI. CONCLUSION

It has been said, a warrior's most formidable weapon is his mind. It follows then that the sharper the commanders mind, the sounder the decisions.

—Boin et al., *The Politics of Crisis Management*

The primary aim of this thesis has been to examine the potential for MT to be worthwhile as a means to enhance first-responder crisis decision making.

Secondary, and related, questions were:

- What do the predominant paradigms, frameworks, models, and systems tell us about how first responders make decisions during crises?
- What human factors, skills, and abilities correlate with enhanced first-responder crisis decision making?
- What has been the impact of MT on various aspects of human performance that might demonstrate applicability to first responder crisis-decision making?
- What counterarguments and cautions should be considered in the examination of the potential for MT programs to enhance first-responder crisis decision making?
- How might MT programs be effectively implemented within first responder programs?

In regard to the primary question, evidence has been presented demonstrating that MT may be one way in which first responders can improve upon their capacity to make effective decisions during crisis. MT has been shown to result in behavioral, neurological, physiological, and biochemical changes, development of a variety of human factors, and the learning of skills and abilities applicable to this desired performance improvement. Some researchers have referred to these human factors, skills, and abilities as *sources of power*.²⁶⁰ It has been demonstrated that mindfulness is likely to result in such sources of power as improvements to working memory capacity, attentional control,

²⁶⁰ Klein, *Sources of Power*.

tolerance for challenging experience, heightened awareness, and the elimination or reduction of negative emotions, anxieties, biases, and expectations. Additionally, mindfulness appears to have a positive correlation to the ability to respond rather than to react, as well as the capacity to engage in creative thinking under pressure, and the facility to avoid the negative effects of information overload by maintaining focus more effectively on the information that is relevant; the signals within the noise of a crisis event.

To arrive at the aforementioned conclusions in regard to the primary research question, it was necessary to examine and analyze what predominant *paradigms, frameworks, models, and systems* demonstrate about how first responders make decisions during crises. This examination and analysis revealed that the aforementioned *sources of power* represent many of the *human factors, skills, and abilities* that correlate well with enhanced crisis decision making.

Research revealed a variety of valid counterarguments, cautions, and implementation challenges that should be taken into account when considering the potential for MT programs to enhance first-responder crisis decision making. Despite these not insignificant implementation challenges, this thesis proposes that at some point in the future, MT will be accepted as being equally essential to a first responder's fitness routine as physical training is today. Implementation recommendations included a deliberate focus on the strong neurological, physiological, and biochemical evidence in the argument for MT training, branding mindfulness, and MT with terms that would tend to be attractive to first responders, the crafting of MT programs that include some aspect or aspects of physical movement, development of discipline specific and culturally relevant MT systems, seeking the cooperation of management, as well as labor organizations, and considering applications for grant funding from a variety of sources.

Those who are skeptical or ambivalent concerning the likelihood of first responders to engage in MT on a wide scale would be well advised to consider the compelling analogy offered by Amishi Jha, who points out, "One hundred years ago, the idea that people would willingly get on a bicycle that's had its back wheel removed to

pedal as hard and fast as they can, for thirty minutes at a time to get absolutely nowhere would have sounded preposterous.”²⁶¹

The first responder community is so often focused on system (i.e., NIMS/ICS) and technology that we tend to neglect what Goerling has referred to as “the *organic technology*: the person behind the badge and how to sharpen the senses through a whole-person approach to resiliency.”²⁶² Perhaps now is the time for the homeland security enterprise to place a heightened emphasis on the exploration of first responder MT in the continual pursuit of a more secure and resilient nation.

²⁶¹ “Cane Talks—Amishi Jha,” YouTube video, 12:31, posted by “University of Miami,” February 13, 2016, https://www.youtube.com/watch?v=AM_w7aEuZBg.

²⁶² Richard Goerling, personal email to the author, May 15, 2015.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Altman, Alex. "Person of the Year: The Short List, No. 4: Black Lives Matter." *Time Magazine*. Accessed August 15, 2016. <http://time.com/time-person-of-the-year-2015-runner-up-black-lives-matter/> on.
- Ancona, Deborah. "Chap 1: Sensemaking: Framing and Acting in the Unknown." In *The Handbook for Teaching Leadership: Knowing, Doing, and Being*, edited by Scott Snook, Nitin Nohria, and Rakesh Khurana. Thousand Oaks, CA: Sage Publications, 2012.
- Ariely, Dan. *Summary of Predictably Irrational*. Instaread, 2016. Kindle edition.
- Aviation Week Network. "Decisions Flowchart." September 2015. http://aviationweek.com/site-files/aviationweek.com/files/uploads/2015/09/Decisions_Flowchart.jpg.
- Baer, Ruth A., Gregory T. Smith, and Kristen B. Allen. "Assessment of Mindfulness by Self-report: The Kentucky Inventory of Mindfulness Skills." *Assessment* 11, no. 3 (September 2004): 191–206. <http://www.ncbi.nlm.nih.gov/pubmed/15358875>.
- Ballam, Ed. "A Minute Decided Worcester's Fate." *Firehouse.Com News*, December 2009. doi:10470598.
- Bellavita, Christopher. "Changing Homeland Security: What Is Homeland Security?" *Homeland Security Affairs*, June 1, 2008. <https://www.hasj.org/articles/118>.
- Bertrand, Robert, and Chris Lajtha. "A New Approach to Crisis Management." *Journal of Contingencies and Risk Management* 10, no. 4 (December 2002): 181–191.
- Bishop, Scott R., Mark Lau, Shauna Shapiro, Linda Carlson, Nicole D. Anderson, James Carmody, Zindelo V. Segal, Susan Abbey, Michael Specia, Drew Velting, and Gerald Devins. "Mindfulness: A Proposed Operational Definition." *Clin Psychol Sci Prac.* 11 (2004): 230–241.
- Bisson, Johnathan I. "Post-traumatic Stress Disorder." *Occup Med (Lond)* 57, no. 6 (2007): 399–403. <http://occmed.oxfordjournals.org/content/57/6/399.short>.
- Blum, Lawrence N., and Joseph M. Polisar. "Why Things Go Wrong in Police Work." *The Police Chief* 71, no. 7 (July 2004). http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=336&issue_id=72004.
- Boin, Arjen, and Cynthia Renaud. "Orchestrating Joint Sensemaking across Government Levels: Challenges and Requirements for Crisis Leadership." *Journal of Leadership Studies* 7, no. 3 (2013): 1–6. <http://onlinelibrary.wiley.com/doi/10.1002/jls.21296/pdf>.

- Boin, Arjen, Paul 't Hart, Eric Stern, and Bengt Sundelius. *The Politics of Crisis Management: Public Leadership under Pressure*. New York: Columbia University Press, 2005.
- Boyce, Barry. "Inhale, Exhale, Fight Fire." *Mindful Magazine*, August 24, 2010. <http://www.mindful.org/inhale-exhale-fight-fire/>.
- Brown, Kirk Warren, and Richard M. Ryan. "The Benefits of Being Present: Mindfulness and its Role in Psychological Well-being." *J Pers Soc Psychol.* 84, no. 4 (2003): 822–848.
- "Cane Talks—Amishi Jha." YouTube video, 12:31. Posted by "University of Miami." February 13, 2016. https://www.youtube.com/watch?v=AM_w7aEuZBg.
- Christopher, Michael S., Richard J. Goerling, Brant S. Rogers, Matthew Hunsinger, Greg Baron, Aaron L. Bergman, David T. Zava. "A Pilot Study Evaluating the Effectiveness of a Mindfulness-based Intervention on Cortisol Awakening Response and Health Outcomes among Law Enforcement Officers." *Journal of Police and Criminal Psychology* 31, no. 1 (January 23, 2015): 15–28.
- Clark, Taylor. *Nerve*. New York: Little, Brown and Company, 2011.
- Combating Terrorism Center at West Point. "Chief Joseph W. Pfeifer." Accessed January 21, 2016. <https://www.ctc.usma.edu/posts/experts/chief-joseph-pfeifer>.
- Congleton, Christina, Britta K. Hölzel, and Sara W. Lazar. "Mindfulness Can Literally Change Your Brain." *Harvard Business Review*, January 8, 2015. <https://hbr.org/2015/01/mindfulness-can-literally-change-your-brain>.
- Creswell, John W., and Vicki L. Plano Clark. *Designing and Conducting Mixed Methods Research*. 2nd ed. Thousand Oaks, CA: SAGE Publications, 2007. <http://doc1.lbfl.li/aca/FLMF022364>.
- Demaree, Nathan. "Overcoming Panic: Stress Induced Training and Education." *Fire Engineering*, May 1, 2015. <http://www.fireengineering.com/articles/print/volume-168/issue-5/departments/training-notebook/overcoming-panic-stress-induced-training-and-education.html>.
- Deuster, Patricia A., and Eric Schoomaker. "Mindfulness: A Fundamental Skill for Performance Sustainment and Enhancement." *Journal of Special Operations Medicine* 15, no. 1 (Spring 2015): 93–9.
- Dow, Martha, Len Garis, and Larry Thomas. *Reframing Situational Awareness within the Fire Service Culture*. Abbotsford, BC: Centre for Public Safety and Criminal Justice Research, University of the Fraser Valley, 2013.

- Driskell, James E., Eduardo Sala, Joan H. Johnston, and Terry N. Wollert. "Chapter 14, Stress Exposure Training: An Event-Based Approach." In *Performance under Stress*, edited by James L. Szalma and Peter A Hancock, 271–286. Burlington, VT: Ashgate Publishing, 2008.
- Dvorsky, George. "The 12 Cognitive Biases that Prevent You from Being Rational." January 9, 2013. <http://io9.com/5974468/the-most-common-cognitive-biases-that-prevent-you-from-being-rational>.
- Emergency Management Institute. *ICS Glossary*. Emmitsburg, MD: Emergency Management Institute, 2008. <https://training.fema.gov/emiweb/is/icsresource/assets/icsglossary.pdf>.
- Endsley Mica R. "The Role of Situation Awareness in Naturalistic Decision Making." In *Naturalistic Decision Making*, edited by Caroline E. Zsombok and Gary A. Klein, 269–292. Mahwah, NJ: L. Erlbaum Associates, 1997.
- Fabiny, Anne. "What Meditation Can Do for Your Mind, Mood, and Health." *Harvard Health Publications*, August 2014. <https://hms.harvard.edu/sites/default/files/assets/Harvard%20Now%20and%20Zen%20Reading%20Materials.pdf>.
- Farias, Miguel, and Catherine Wikholm. "Mindfulness or McMindfulness." *Science 2.0: The Conversation*, June 2015.
- Federal Emergency Management Agency. *NIMS: Frequently Asked Questions*. Washington, DC: Department of Homeland Security, n.d. <https://www.fema.gov/pdf/emergency/nims/nimsfaqs.pdf>.
- Fitch, Brian. "Good Decisions: Tips and Strategies for Avoiding Psychological Traps." *FBI Law Enforcement Bulletin* 79, no. 6 (June 2010).
- Flach, John M. "Situation Awareness: Proceed with Caution." *Human Factors*, 37, no. 1 (1995): 149–157.
- Fox, Kieran C., Savannah Nijeboer, Matthew L. Dixon, James L. Floman, Melissa Ellamil, Samuel P. Rumak, Peter Sedlmeier, and Kalina Chirstoff. "Is Meditation Associated with Altered Brain Structure? A Systematic Review and Meta-analysis of Norphometric Neuroimaging in Meditation Practitioners." *Neurosci. Biobehav. Rev.* 43 (June 2014): 48–73. doi:10.1016/j.neubiorev.2014.03.016.
- Frankl, Victor E. *Man's Search for Meaning*. Boston: Beacon Press, 2006.
- Fullerton, Carol S., Robert J. Ursano, and Leming Wang. "Acute Stress Disorder, Posttraumatic Stress Disorder, and Depression in Disaster or Rescue Workers." *The American Journal of Psychiatry* 131, no. 8 (August 2004): 1370–1376. <http://ajp.psychiatryonline.org/doi/abs/10.1176/appi.ajp.161.8.1370>.

- Gasaway, Richard. "Awareness about Awareness." SAMatters.com. Accessed July 11, 2016. <http://www.samatters.com/meta-awareness/>.
- Gasaway, Richard B. *Fireground Command Decision Making: Understanding the Barriers Challenging Commander Situational Awareness*. Roseville, MN: Gasaway Consulting Group, LLC., 2009.
- George Mumford. "The Mindful Athlete." July 19, 2016. <http://mindfulathlete.org/>.
- Goerling, Richard. "The Role of Mindfulness Training to Policing A Democratic Society." Officer Safety Corner, *Police Chief Magazine* 81 (April 2014).
- . "Warrior Resilience: Teaching Mindful Integration in Law Enforcement Culture and Training." In *The Authentic Leadership Series*, interview by James Thompson. Charles Town, WV: American Public University, 2013.
- Gordhamer, Soren. "Mindfulness: The Seattle Seahawk's Sports Psychologist Shares Why It Matters." *Huffington Post*, April 2014.
- Grossman, David A. *On Combat: The Psychology and Physiology of Deadly Conflict in War and Peace*, 3rd ed. Mascoutah, IL: Warrior Science Publications, 2008.
- Harvard University, The Graduate School of Arts and Sciences. "Mindfulness Meditation: A Mental Workout to Benefit the Brain." August 15, 2103. <http://sitn.hms.harvard.edu/flash/2013/mindfulness-meditation-a-mental-workout-to-benefit-the-brain/> on.
- Headquarters, United States Marine Corps. *Command and Control MCDP 6*. Washington, DC: Department of the Navy, 1996. <https://fas.org/irp/doddir/usmc/mcdp6.pdf>.
- Heal, Sid. *Sound Doctrine: A Tactical Primer*. New York: Lantern Books, 2000.
- Heifetz, Ron. *Leadership without Easy Answers*. New York: Harvard University Press, 1998.
- Heifetz, Ronald A., and Donald L. Laurie. "The Work of Leadership." *Harvard Business Review*, January–February 1997, 124–134. <http://www4.ncsu.edu/unity/users/p/padilla/www/435-Leadership/Heifetz%20and%20Laurie%20The%20work%20of%20leadership.pdf>.
- Heuer, Richards J., Jr. *Psychology of Intelligence Analysis*. Washington, DC: Center for the Study of Intelligence, 1999. Kindle edition.

- Holmes, Lindsay. "A Simple Practice Can Transform the Lives of First Responders." *Huffington Post*, last modified August 21, 2015. http://www.huffingtonpost.com/entry/how-this-simple-practice-may-transform-the-lives-of-first-responders_us_55cb754be4b0f1cbf1e6ff66.
- Huffington Post Online. "How Mindfulness Training Could Help People with PTSD Symptoms." May 2013. www.huffingtonpost.com/2013/05/29/mindfulness-ptsd-symptoms-cortisol_n_3348593.html.
- Ie, Amanda, Christelle T. Ngnoumen, and Ellen J. Langer, ed. *The Wiley Blackwell Handbook of Mindfulness*, 1st ed. Hoboken, NJ: John Wiley & Sons, 2014.
- International Association of Fire Chiefs Technology Council. *An Information Paper on Crisis Decision making Training Technology*. Fairfax, VA: International Association of Fire Chiefs, 2012. <https://www.iafc.org/files/1COMMTECH/InformationPaperonCrisisDecisionMakingTech.pdf>.
- James, William. *The Principles of Psychology* vol. 1. New York: Henry Holt, 1890. doi:10.1037/10538-000.
- Jaworski, Joseph, and C. Otto Scharmer. *Leadership in the New Economy: Sensing and Actualizing Emerging Futures*. Cambridge, MA: Society for Organizational Learning and Generon, 2000.
- Jha, Amishi P., Elizabeth A. Stanley, Anastasia Kiyonaga, Ling Wong, and Lois Gelfand. "Examining the Protective Effects of Mindfulness Training on Working Memory Capacity and Affective Experience." *Emotion* 10, no. 1 (2010): 54–64.
- Jha, Amishi P., Scott L. Rogers, and Alexandra B. Morrison. "Mindfulness Training in High Stress Professions: Strengthening Attention and Resilience." In *Mindfulness-Based Treatment Approaches: Clinician's Guide to Evidence Base and Applications*, edited by Ruth A. Baer, vol. 347, 2nd ed. 348–365. London: Academic Press, 2014.
- Jha Lab, The. "Mindfulness-Based Attention Training: Firefighter." Accessed July 9, 2016. <http://www.amishi.com/lab/>.
- Goyal, Madhav, Sonal Singh, Erica M. S. Sibinga, Neda F. Gould, Anastasia Rowland-Seymour, Ritu Sharma, Zackary Berger, Dana Sleicher, David D. Maron, Hasan M. Shihab, Padmini D. Ranasinghe, Shauna Linn, Shonali Saha, Eric B. Bass, and Jennifer A. Haythornthwaite. "Meditation Programs for Psychological Stress and Well Being: A Systematic Review and Meta-Analysis." *JAMA Intern Med.* 174, no. 3 (2014): 357–368. <http://archinte.jamanetwork.com/article.aspx?articleid=1809754>.
- Kabat-Zin, Jon. *Wherever You Go, There You Are: Mindful Meditation In Everyday Life*. Hoboken, NJ: Hyperion, 1994.

- Kahneman, Daniel. *Thinking Fast and Slow*. New York: Farrar, Straus, and Giroux, 2011.
- Kastros, Anthony. "Mastering Fireground Command, Calming the Chaos" *Fire Engineering*, March 2011. <http://www.fireengineering.com/articles/print/volume-164/issue-8/features/mastering-fireground-command-10-commandments-of-command.html>.
- Keogh, Jim. "The Fire That Still Burns." December 2, 2009, *Worcester Magazine*. <http://worcestermag.com/2009/12/02/the-fire-that-still-burns/7157>.
- Klein, Gary. "Analysis of Situation Awareness Reports from Critical Incident Reports." In *Situation Awareness Analysis and Measurement*, edited by Micah R. Endsley and Daniel J. Garland. Mahwah, NJ: Lawrence Erlbaum Assoc., 2000.
- . *Human Factors* 50, no. 3 (June 2008): 456–60.
- . *Sources of Power*. Cambridge, MA: The MIT Press, 1998.
- . *The Power of Intuition*. New York: Doubleday, 2003.
- Klein, Gary A., Judith Orasanu, and Robert Caldenwood. *Decision making in Action: Models and Methods*. Norwood, NJ: Ablex Publishing Corp., 1993.
- Klein, Gary, Brian Moon, and Robert R. Hoffman. "Making Sense of Sensemaking 1: Alternative Perspectives." *IEEE Intelligent Systems* 21, no. 4 (July–August 2006): 70–73. doi:10.1109/MIS.2006.75.
- Kowalski, Kathleen M., and Charles Vaught. *Judgment and Decision Making under Stress: An Overview for Emergency Managers*. Pittsburg, PA: National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, n.d. <https://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/jadmus.pdf>.
- Kowalski-Trakofler, Kathleen M., Charles Vaught, and Ted Scharf. "Judgment and Decision Making under Stress: An Overview for Emergency Managers." *Int. J. of Emergency Management* 1, no. 3 (2003): 278–289.
- Kukull, Walter A., and Mary Gangulli. "Generalizability." *Neurology* 78, no. 23 (June 5, 2012): 1886–1891. doi:10.1212/WNL.0b013e318258f812.
- Lazenby, Roland. "The Zen Master's Zen Master: How Phil Jackson's Mindfulness Guru Is Helping the New York Knicks." July 14, 2015. https://sports.vice.com/en_us/article/the-zen-masters-zen-master-how-phil-jacksons-mindfulness-guru-is-helping-the-new-york-knicks.

- Levinson, Daniel B., Eli S. Stoll, Sonam D. Kindy, Hillary L. Merry, and Richard J. Davidson. "A Mind You Can Count On: Validating Breath Counting as a Behavioral Measure of Mindfulness." *Frontiers in Psychology* 5 (October 24, 2014): 1202. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4208398/>.
- Lipschitz, Raanan. "Converging Themes in the Study of Decision Making in Realistic Settings." In *Decision Making in Action: Models and Methods*, edited by Gary A. Klein, Judith Orasanu, Robert Calderwood, and Caroline E. Zsombok. 103–137. Norwood, NJ: Ablex. 1993.
- Malinowski, Peter. "Mindfulness Research—Where Are We Here and Now?" *Mediation Research*, February 1, 2014. <http://meditation-research.org.uk/2014/02/mindfulness-research-where-are-we-here-and-now/>.
- Marcus, Leonard J., Eric McNulty, Barry C. Dorn, and Eric Goralnick. *Crisis Meta-Leadership Lessons from the Boston Marathon Bombings Response: The Ingenuity of Swarm Intelligence*. Cambridge, MA: Harvard School of Public Health and the Harvard Kennedy School of Government, Center for Public Leadership, 2014. <https://cdn2.sph.harvard.edu/wp-content/uploads/sites/8/2014/04/April-2014-Prelim-Report-Dist1.pdf>.
- Matousek, Rose H., Patricia L. Dobkin, and Jens C. Pruessner. "Cortisol As a Marker for Improvement in Mindfulness-based Stress Reduction." *Complement Ther Clin Pract.* 16, no. 1 (February 2010): 13–9. doi:10.1016/j.ctcp.2009.06.004.
- McGreevey, Sue. "Eight Weeks to a Better Brain." *Harvard Gazette*, January 21, 2011. <http://news.harvard.edu/gazette/story/2011/01/eight-weeks-to-a-better-brain/>.
- McKay, Jim. "Was Orlando an Intelligence Failure." *Emergency Management*, Summer 2016.
- Mind Fitness Training Institute. "Mindfulness-based Mind Fitness Training." Accessed July 9, 2015. www.mind-fitness-training.org/training.html.
- Mindful Living Programs. "What Is MBSR?" Accessed July 9, 2015. <http://www.mindful-livingprograms.com/whatMBSR.php>.
- Mindful Magazine. "Mindful." Accessed June 7, 2014. <http://www.mindful.org/news/mindfulness-in-the-police-chief-magazine>.
- MindTools. "The Cynefin Framework." June 14, 2016. <https://www.mindtools.com/pages/article/cynefin-framework.htm>.
- Muller, Bill. "Leaders We Would Like to Meet—Ted Putnam." *Wildland Fire Leadership*, January 2004. www.fireleadership.gov/toolboxes/leaders_meet/interviews/leaders_TedPutnam.html.

- Murata, Atsuo, Tomoko Nakamura, and Waldemar Karwoski. "Influence of Cognitive Biases in Distorting Decision Making and Leading to Critical Unfavorable Incidents." *Safety* 1, no. 1 (2015): 44–58. doi:10.3390/safety1010044.
- Murphy, Sean. "Cultivating Mindfulness." SKMurphy. Accessed June 21, 2016. <http://www.skmurphy.com/blog/2014/07/28/cultivating-mindfulness/>.
- Musashi, Kai. *The 25 Cognitive Biases*. Middletown, DE: n.p., 2016.
- National Institute for Occupational Safety and Health (NIOSH), The. "Six Career Firefighters Killed in Cold-Storage and Warehouse Building Fire-Massachusetts." September 27, 2000. <https://www.cdc.gov/niosh/fire/reports/face9947.html>.
- Novotny, S. "The Science of Breathing." *IDEA Fitness Journal* 4, no. 2 (February 1, 2007). <http://www.ideafit.com/fitness-library/science-breathing>.
- Patton, Michael Quinn. *Qualitative Research & Evaluation Methods*, 3rd ed. Thousand Oaks, CA: Sage Publications, 2002.
- Pfeifer, Joseph W. "Command Resiliency: An Adaptive Response Strategy for Complex Incidents." Master's thesis, Naval Postgraduate School, 2005.
- . *Crisis Leadership: The Art of Adapting to Extreme Events*. Cambridge, MA: Harvard Kennedy School Program on Crisis Leadership, 2013. <http://www.hks.harvard.edu/content/download/67377/1242318/version/1/file/Pfeifer+Crisis+Leadership--March+20+2013.pdf>.
- Pfeifer, Joseph, and James Merlo. "The Decisive Moment: The Science of Decision Making under Stress." In *Leadership in Dangerous Situation: A Handbook for the Armed Forces, Emergency Services and First Responders*, edited by P. Sweeney, M. Matthew, and P. Lester. 230–248. Annapolis, MD: Naval Press, 2011.
- Potter, George. *The White Bedouin*. Springville, UT: Council Press, 2007.
- Renaud, Cynthia. "Making Sense in the Edge of Chaos." Master's thesis, Naval Postgraduate School, 2010.
- . "The Missing Piece of NIMS: Teaching Incident Commanders How to Function in the Edge of Chaos." *Homeland Security Affairs*, June 1, 2012. <https://www.hsaj.org/articles/221>.
- Revere, Marc. "'Sensemaking' and Its Effect on Firefighter and Fire Officer Decisions." *Firefighter Nation*, October 2, 2012. <http://www.firefighternation.com/article/command-and-leadership/sensemaking-and-its-effect-firefighter-and-fire-officer-decisions>.

- Richard, Donald, and Susan Balaban. "Using Mindfulness and Qigong and Tai Chi Practices to Help Officers Manage Stress: Evidence Based Treatment for Stress and Post-traumatic Stress Disorder." Education session at International Association of Chiefs of Police Conference, Orlando, FL, October 1, 2014.
- Richards, Chet. *Boyd's OODA Loop (It's Not What You Think)*. Atlanta: J. Addams & Partners, Inc., 2012. http://www.jvminc.com/boydsrealooda_loop.pdf.
- Robinson, Tim. "Wayfinding in Zero Visibility." *Fire Engineering*, December 20, 2013. <http://www.fireengineering.com/articles/print/volume-166/issue-12/departments/training-notebook/wayfinding-in-zero-visibility.html>.
- Ryan, Tim. *A Mindful Nation*. Carlsbad, CA: Hay House, Inc., 2012.
- Safran, Jeremy D. "McMindfulness: The Marketing of Well-Being." *Psychology Today*, June 13, 2014. <https://www.psychologytoday.com/blog/straight-talk/201406/mcmindfulness>.
- Salas, Eduardo, James E. Driskell, and Sandra Hughes. "The Study of Stress and Human Performance." In *Stress and Human Performance*, edited by James E. Driskell and Eduardo Salas. 1–45. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.
- Saveland, Jim, and Ivan Pupulidy. "Rappel Accident Human Performance Analysis." U.S. Forest Service, Will Helibase Rappel Accident, July 2009. <http://bit.ly/1oBuQzp>.
- Schutz, Priscilla. "Objective Assessment of Peritraumatic Dissociation: Psychophysiological Indicators." *American Journal of Psychiatry* 154, no. 8 (1997): 1080–1088.
- Science Daily. "Confirmation Bias." Accessed March 21, 2016. https://www.science-daily.com/terms/confirmation_bias.htm.
- Search Inside Yourself Leadership Institute. "Search Inside Yourself." Accessed August 8, 2016. <https://siyli.org/whysiy/>.
- Sears, Jayne. "The Importance of Vital Signs." *Fire Engineering*. October 1, 2007. <http://www.fireengineering.com/articles/print/volume-168/issue-5/departments/training-notebook/overcoming-panic-stress-induced-training-and-education.html>.
- Seligman, Martin E. P., and Mihaly Csikszentmihalyi. "Positive Psychology: An Introduction." *American Psychologist* 55, no. 1 (February 2000): 5–14.
- Shapiro, Shauna L., Linda E. Carlson, John A. Astin, and Benedict Freedman. "Mechanisms of Mindfulness." *J Clin Psychol.* 62, no. 3 (2006): 373–386.

- Simon, Herbert A. *Models of Man: Social and Rational*. New York: Wiley, 1957. As referenced in Gary Klein, *Sources of Power*. Cambridge, MA: The MIT Press, 1998.
- Sipe, Walter E. B., and Stuart J. Eisendrath. “Mindfulness-based Cognitive Therapy: Theory and Practice.” *Can J Psychiatry* 57, no. 2 (February 2012): 63–9. doi:22340145.
- Smallman, Clive. “We Are the Change We Seek, The Importance of Mindfulness to How We Make Decisions.” Accessed July 10, 2016. <https://clivesmallman.org/2015/09/12/the-importance-of-mindfulness-to-how-we-make-decisions/>.
- Smith, Bruce W., J. Alexis Ortiz, Laurie E. Steffen; Erin M. Tooley, Kathryn T Wiggins, Elizabeth A. Yeater, John D. Montoya, and Michael L. Bernard. “Mindfulness Is Associated with Fewer PTSD Symptoms, Depressive Symptoms, Physical Symptoms, and Alcohol Problems in Urban Firefighters.” *Journal of Consulting and Clinical Psychology* 79 no. 5 (October 2011): 613–17. doi:10.1037/a0025189.
- Smith, Cedric M. “Origin and Uses of Primum Non Nocere—Above All, Do No Harm!” *Journal of Clinical Pharmacology* 45, no. 4 (April 1, 2005): 371–7.
- Smith, Tyler C., Deborah L. Wingard, Margaret A. Ryan, Donna Kritz-Silverstein, Donald J. Slymen, James F. Sallis, and Millennium Cohort Study Team. “PTSD Prevalence, Associated Exposures, and Functional Health Outcomes in a Large, Population Based Military Cohort.” *Public Health Rep* 124, no. 1 (January–February 2009): 90–102.
- Snowden, Dave. “Cynefin Dynamics.” July 2, 2015. <http://cognitive-edge.com/blog/cynefin-dynamics/>.
- Snowden, David J., and Mary E. Boone. “A Leader’s Framework for Decision Making.” November, 2007, *Harvard Business Review*. <https://hbr.org/2007/11/a-leaders-framework-for-decision-making>.
- Stanley, Elizabeth A. *Handbook of Mindfulness*. New York: John Wiley & Sons, Ltd., 2014.
- . *The Wiley Blackwell Handbook of Mindfulness*, edited by Amanda Ie, Christelle T. Ngnoumen, and Ellen J. Lange. New York: Wiley Blackwell, 2014.
- Stanley, Elizabeth A., and Amishi P. Jha. “Mind Fitness and Mental Armor: Enhancing Performance and Building Resilience.” *Joint Force Quarterly* 55 (4th Quarter 2009): 1–8.

- . “Mind Fitness: Improving Operational Effectiveness and Building Warrior Resilience.” U.S. Army, October 30, 2009. https://www.army.mil/article/29549/Mind_Fitness__Improving_Operational_Effectiveness_and_Building_Warrior_Resilience.
- . “Mind Fitness and Mental Armor.” *Joint Force Quarterly* 55, October 2009.
- Steenhuisen, Julie. “Research Shows Why Some Soldiers Are Cool under Fire.” *Reuters*, February 2009. www.reuters.com/article/2009/02/16/us-stress-soldiers-idUSTRE5IF02B20090216.
- Strozzi-Heckler, Richard. *In Search of the Warrior Spirit*. Berkeley, CA: North Atlantic Books, 1992.
- . *In Search of the Warrior Spirit, Fourth Edition: Teaching Awareness Disciplines to the Green Berets*. Berkeley, CA: Blue Snake Books, 2007.
- Sullivan, David L. “Learn to Make Better Decisions and Improve Patient Care.” *Journal of Emergency Medical Services*, March 31, 2010. <http://www.jems.com/articles/print/volume-35/issue-4/training/learn-make-better-decisions-an.html>.
- Szalavitz, Maia. “Q&A: Jon Kabat-zinn Talks about Bringing Mindfulness Meditation to Medicine.” *Time Magazine*, January 2012. <http://www.healthland.time.com/2012/01/11/mind-reading-jon-kabat-zinn-talks-about-bringing-mindfulness-meditation-to-medicine>.
- UC Berkeley, University Health Services. “Care Services Mind Body Program.” Accessed July 5, 2015. <https://uhs.berkeley.edu/facstaff/care/mindfulness/>.
- UMASS Medical School. “History of MBSR.” Accessed August 20, 2016. <http://www.umassmed.edu/cfm/stress-reduction/history-of-mbsr/>.
- University of California at Berkeley. “Greater Good: The Science of a Meaningful Life.” January 7, 2016. <http://www.greatergood.berkeley.edu/topic/mindfulness/definition>.
- University of Massachusetts. “Workplace MBSR Programs.” Accessed July 6, 2015. www.umass.edu/cfm/Stress-reduction/workplace-Programs/.
- University of Miami, College of Arts & Sciences. “Research.” May 30, 2016. <http://www.psy.miami.edu/graduate/health-division/research/>.
- University of Oregon. “Body-mind Meditation Boosts Performance, Reduces Stress.” *ScienceDaily*, October 9, 2007. www.sciencedaily.com/releases/2007/10/071008193437.htm.

- Vandergriff, Donald E. "Unlocking the Power of Colonel John Boyd's OODA Loop." Project on Government Oversight, April 28, 2015. <http://www.pogo.org/strauss/issues/military-people-and-ideas/2015/unlocking-the-power-of-john-boyd-ooda-loop.html?referrer=https://www.google.com/>.
- Walsh, Kevin J., and Vincent E. Henry. "Compstat, OODA Loops and Police Performance Management." *Policing* 2, no. 3 (2008): 349–358. doi:10.1093/police/pan046.
- Walsh, Roger. "Meditation Practice and Research." *Journal of Humanistic Psychology* 23, no. 1 (Winter 1983): 18–50. doi:10.1177/0022167883231004.
- Wei, Marlynn. "Yoga and Meditation Offer Health Care Savings—and You Can Do Them at Home." *Harvard Health Publications: Harvard Medical School*, November 18, 2015. <http://www.health.harvard.edu/blog/yoga-and-meditation-offer-health-care-savings-and-you-can-do-them-at-home-201511188616>.
- Weick, Karl. *Sensemaking in Organizations*. Thousand Oaks, CA: Sage Publications, 1995.
- Weick, Karl E., and Kathleen M. Sutcliffe. *Managing the Unexpected; Resilient Performance in an Age of Uncertainty*. Hoboken, NJ: John Wiley & Sons, 2011.
- West, Michael A. *The Psychology of Meditation*. Oxford, UK: Oxford University Press, 2016.
- White House, The. *Homeland Security Presidential Directive-8*. Washington, DC: The White House, 2003.
- Yoga Hillsboro & The Stress Reduction Clinic. "MBRT 8-week Program for First Responders." Accessed July 2, 2015. www.yogahillsboro.com/event/mbrt-8-week-program-summer/.
- Zimmerman, Laura Ann. "Beyond Tactics: Enhancing Decision making Skills during Critical Incidents." *NRA Law Enforcement Quarterly*, Spring 2007.
- Zimmerman, Laura A., and David Blake. "Officers Facing Criminal Charges; Faulty Decision Making?" *ILEETA Journal* 5, no. 4 (Winter Edition 2015). <http://liferaftinc.com/images/uploads/ILEETA-Journal-4th-Edition-2015.pdf>.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California